ELECTRICAL WEST

WITH WHICH IS CONSOLIDATED THE JOURNAL OF ELECTRICITY

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W. A. CYR, *Associate Editor*
C. W. LEIHY, *Associate Editor*
R. H. FLYNN, *Assistant Editor*

G. C. TENNEY, *Editor*

D. D. PREDE, *News Editor*
B. H. SNOW, *Northwest Editor (Portland, Ore.)*

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JAMES H. MCGRAW, *Chairman of the Board*
EDGAR KOBAK, *President*
NATHAN A. BOWERS, *Vice-President and General Manager*
GEORGE C. TENNEY, *Vice-President*
HOWARD C. WORDEN, *Secretary and Treasurer*

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Have you noticed there are Connectors galore in the new LAPP Catalog

THE small assortment and lack of complete catalog data on suspension connectors has long been a sore spot when planning new construction. That condition has been cured. For instance, note the variety of pieces shown on this page . . . square shank and non-swivel fittings for attachment of arcing devices, variable widths of tongues to prevent slop, the well designed links, hooks, clevises and ball eyes, and forged socket fittings originated by Lapp. Yet these are only a few of the many types and sizes shown in the new Lapp Catalog.

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Volume 67
Number 6

G. C. TENNEY, *Editor*

PORTLAND'S famous appliance sales regulatory ordinance, under fire, is upheld. Merchants unite in urging its retention, citing the stabilizing effect it has on selling practices.

▼

ONLY the roar remains unused now. Latest by-product of steam plant generation is dry ice, made from hot stack gases.

▼

WESTERN courts have rendered surprising decisions, some still subject to review:
—In Idaho municipalities were declared immune from anti-trust laws in the operation of utilities;
—The Santa Cruz case establishes in California the right of a municipality to build works to be paid for out of revenues, without submitting the projects to vote;
—Strangely enough a California power company won the right to lower its rates in one district to meet municipal competition, without lowering them in others.

▼

BEVERLY HILLS expressed itself satisfied with its electric service, hence having no need for Hoover Dam power.

▼

NOTHING succeeds like success, and executives of industrial plants are convinced of the value of electrification as by no other possible method when taken for a tour of the modern western plant of a successful manufacturer.

The Month

ADVERSITY brings back fellowship. At least the electrical leagues which flourished years ago are being revived with a will.

▼

MORE than ever this year will the twinkling stars of Christmas lighting need to bring cheer to a burdened world. An unique opportunity awaits the industry in this heartening contribution to the public weal.

▼

FIRST harness ever placed upon the charging white steeds of the Columbia River is the Northwest's first major low head hydro development at Rock Island.

▼

FAR-REACHING are some of the many new rules of this year's National Electrical Code. Some of the significant changes are worth special scrutiny.

▼

WHAT is the built-in idea doing to motor distribution and to the dealers thereof? Some genuine economic sleuthing should bring many facts to light, perhaps generate important changes and remedies.

Editorial

Contractor's Interest in Inspectors' Conventions

IT WAS frequently expressed in and around the convention of the Northwest Inspectors at Salem last month that more contractors should have been present at the meeting; less so in San Francisco, for at the Southwest Inspectors' meeting there, contractors played an important part in the proceedings. The reason for this feeling in the Northwest was that a number of subjects of importance to the contracting business were discussed in the sessions and a number of ideas bearing on selling wiring were brought forth. ELECTRICAL WEST takes this opportunity of bringing before its contractor readers the fact that the Inspectors' Association, through its territorial branches, offers an excellent source of business building information to the contractor who will take advantage of the opportunity to attend the territorial conventions. This is particularly true in localities where the Electragists no longer hold state conventions of their own. They could make the Inspectors' Assocation fill, at least partially, the convention needs of this group.

A check of the registration at both the Salem and San Francisco conventions disclose the extent to which other groups attached importance to these meetings and leads to comments that seem pertinent. The largest representation, aside from the inspectors themselves, was from the manufacturer group. This is perhaps natural since there have always been, and always will be, axes to grind, and from the beginning of inspectors' organizations the manufacturers have felt it desirable to have their say in code making and have been a source of financial and educational strength in giving coherence to the inspection group.

The utility group was also fairly well represented. The growing interest being taken by utility companies in the local inspector and his problem, manifested concretely through supporting memberships in the Inspectors' Association and participation in committee work and discussions on the floor of the meetings, springs wisely from a recognition of the fact that these organizations have a potent influence on the bottleneck through which all kilowatt-hours must pass—the customer's wiring.

The poorest representation was from the wholesaler group. This was unfortunate since the wholesalers' salesmen would have found much of value to their day-to-day work in the subjects discussed at the meeting, and on the other hand, they might have contributed by bringing the viewpoint of the wholesalers to bear on some of the decisions reached. After all, the problems of code making and administration are many sided, and the voice of every branch of the industry should be reflected in the changes that are constantly being evolved.

One fact about the Northwest Inspectors' Association focuses attention on the importance of that and similar bodies in code development. Out of 44 suggested revisions of the National Electrical Code arising in the Northwest association, duly studied in committee, discussed on the floor of their conventions, and finally passed at the recommendation of the association, 24 found their way into the 1931 edition of the code, some of these practically verbatim. Surely, such a record demands recognition of the association by those units of the electrical industry in that territory interested in the sane development of the codes under which they do business.

Inferior and Unsafe— Whose Responsibility?

CHEAP, POORLY built appliances flood the market these days. These characteristics are bad enough, but worse is the danger to human life and hazard to property. Unfortunately, the general acceptance for things electrical will always be used as a mask behind which unscrupulous promoters will try to "muscle in" on a rich market by flooding it with flimsy imitations of standard products. But this becomes criminal when such shoddy apparatus causes injury or death.

The industry for many years has been seeking to dispel the fear which people originally held of electricity,—to prove it a safe and convenient source of energy, indispensable to modern life. Public peace of mind has been achieved at cost of great effort because the responsible forces in the industry have felt a public responsibility and have exerted every influence to maintain high standards of safety and quality in appliance manufacture. When the industry was new, and only a few manufacturers made electrical devices, it was comparatively simple to impress upon all of them the need for providing proper safety and quality. Out of this sense of responsibility grew such excellent research organizations as the Underwriters' Laboratories and the Electrical Testing Laboratories, designed to establish standards and to guarantee them in manufacture.

Many years ago, malpractice in drug concoction and adulteration of foods became criminal in its effects, and the nation was forced to pass pure food

and drug laws to protect the public. In only one city, Portland, has any such legislation been passed to protect the public against inferior appliances. There electrical devices must bear laboratories' approval before being placed on the market.

This problem grows with each passing day. The industry for its own self preservation must face squarely in the not-too-distant future demands from the public that it be protected from abuses of its confidence in electrical appliances.

Just what the industry must do to protect itself and the public from this hazardous condition is difficult to say. Certainly the utilities must abandon any fear that their efforts will be construed as seeking to make electrical service costly. They must boldly reassume their traditional place as the guardians of public service and satisfaction. Just as surely must the honest manufacturers, wholesalers, and dealers join in a concerted drive against those products which are undermining their very livelihood by exposing to the public the danger that lies in cheapness.

"Open House"—An Open Sesame to Load Growth

IN OPENING the year's activity with an "open-house" inspection trip through a modern industrial plant, the Industrial Electrification Committee of the Pacific Coast Electrical Bureau has hit the keynote of post-depression business—selective selling. Concentrating its efforts on a known market, the committee has inaugurated a program of inspection trips, arranged primarily for industrial executives, plant engineers and consultants, which are intended to familiarize these men with the importance of electricity in modern industry.

These inspection trips *are* different. Gone is the customary stroll through the plant and in its place the bureau does a selling job for the electrical industry. The mechanics of the plan are described in full elsewhere in this issue. Its effectiveness lies in the idea of stressing the relation between the electrical installation and plant efficiency and production by short talks to the inspecting groups at intervals along the route through the plant. These talks, given by members of the committee who are familiar with the apparatus involved, bring out the features and principles of the electrical equipment then under observation.

An excellent attendance of manufacturing management and engineers, and a gratifying number of voluntary requests for additional information, attest the interest which the first "open-house" has aroused. The idea is effective, practical and inexpensive. It promotes a valuable contact with industry in its broadest scope. It is an efficient sales medium for widening and increasing the application of electricity.

The Electrical Industry And Unemployment Relief

PROVISION of relief for millions of unemployed is the most urgent human problem facing America today. The necessities of life must be supplied to those who have suffered from unequal division of work and income by those who have money and jobs.

The nationwide program sponsored by government and industry calls for local relief agencies. Unquestionably, those fortunate individuals in the electrical industry who have jobs will contribute to the utmost to the community funds which are being raised. So too will business and industry. But business and industry must assume a still greater share of the responsibility for unemployment and lead in the development of practical plans for relief.

An outstanding example of this leadership is the announcement by the I-T-E Circuit Breaker Company of a plan whereby for the next five months two per cent of gross sales will be distributed to relieve unemployment in those communities in which the sales originate. A special fund of $25,000 has been set up initially. Should other manufacturers follow suit relief would be assured.

Concrete suggestions for relief for unemployed members of the electrical industry also have been made. It has been proposed that the industry band together under the leadership of the utility companies and sponsor sales of lamps or appliances with unemployed people in the industry acting as salesmen. Such experiments were tried with success in a few local communities last winter.

Another plan which doubtless will be given a serious trial in several localities is one for a campaign to have householders replace the lamp cord wiring extensions, so prevalent in almost every home, with permanently wired convenience outlets. While a general remodeling and modernization plan, not supported by a long term payment plan, might find small acceptance in some quarters, this important beginning on an endless task could be made.

The electrical industry must and will shoulder its fair share of the burden of unemployment relief. Individually and collectively it can sponsor and initiate plans that will make suffering lighter.

Christmas Windows—
Happy Hunting Grounds

Most Gift-Dollars Are Bagged in the Last Few Days, so Tidy Up This Effective Ambush With New Holiday Merchandise As Bait

FEW people complete their Christmas shopping before the last days preceding the holidays and then, in haste, they pick the first items which attract their eyes. Thus, the stalking of the Christmas dollar becomes a problem in attractive displays and responsive first impressions. As most buying is done from windows during this time, good window displays are almost a synonym for good business.

Results, not methods, are of consequence in such a hunt. If the presentation will induce desire and compel buying, it is a success, regardless of whether days, hours or minutes were spent in its preparation.

But a good display will not make an unattractive article attractive; it will not sell electrical goods if the public is dead set against them. That this state of mind shall not prevail, the Electrical League of Colorado and the Rocky Mountain Division, N.E.L.A., have undertaken the raising of a fund of more than $3,000 to encourage shoppers to "Give Something Electrical." This slogan will be featured in radio broadcasts, newspaper advertising and cooperative window displays. Billboards, window and counter cards will also be used and 100,000 copies of a Chirstmas gift suggestion booklet will be distributed to all dealers in Colorado, Wyoming and New Mexico.

Such a campaign, late as it now is, would still be productive of much more than the ordinary run-of-the-mill business this holiday season. There is still time for much action.

Then, with all the groundwork laid, it becomes necessary to have something to sell. Manufacturers usually have special Christmas merchandise, made to sell at first glance. Dealers connot expect that the exceedingly minimum stocks carried throughout the past year will suffice for the holiday season; a shopper's psychological temperament demands a choice of something.

Good window displays help make sales, especially during the Christmas season when window shopping is a business and not a diversion. Utah Power & Light's Provo office used this comfort suggesting display

Electrical dealers should always be the chief source of supply for the toy buyers, too. While heretofore electrical toys have ended with trains, jobbers now supply wired doll houses, small automobiles with electric horn and lights, miniature electric ranges, electric cranes, and scores of other articles. Because they are electrical in nature, these toys should be handled by electrical dealers.

Of prime importance is actual customer contact. The dealer, himself, cannot serve every customer and answer every question put by a Christmas shopper. If extra help is engaged, the very best way of spending a few hours' time is in education of the employee. This means education in the types of appliances, their use, their advantages; instruction in competitors' lines so that questions of comparison may be met logically and intelligently; lessons in salesmanship, in the approach and in the closing of a sale. And no employer should forget to impress upon his employees the need for a smile during this season,—and, because the work of shopping makes

The best way to show your Christmas spirit

DRESS up your place of business with decorative lighting. It is the modern expression of the Christmas spirit—the medium used by progressive merchants to advertise and convey their greetings to customers.

Nothing will enhance your building and displays more than colored electrical effects. Lights attractively arranged help to draw the throngs of holiday shoppers and to proclaim your Christmas greetings in a most effective manner.

Show your Christmas spirit with decorative lighting. The generous use of light during the holiday season is a profitable investment in good-will—in next year's business.

San Diego Consolidated Gas and Electric Company

Right—Besides decorating windows to attract shoppers inside, enterprising merchants festoon the store interior to aid sale-making. Newton Electric Co., Glendale, Calif., believes in the practice. It also finds a number of well laden display tables out on the floor are worth many times their weight in show cases

Below—The sales floor of the Southern Colorado Power Co.'s main office in Pueblo is always holiday-decorated. A few decorations and a smile will help make a sale

Right—Simple displays, while inexpensive, are certainly good advertising, Leon J. Donze Electric Co. of Santa Barbara, Calif., believed; so this firm placed a tree in one window, a few well-chosen Christmas appliances in another, and capitalized on the belief

so many people irritable, the need for patience and tolerance.

The recitation of the points given probably sounds childish. But it is refreshing to find a dealer who, in the rush of competing for the Christmas dollar, remembers all of them.

▼

A New Idea Means New Business

"The little stunt has proved a business maker for us and illustrates the fact that every electrical dealer can build new business if he has new ideas." says A. R. Seaton, electrician and salesman for the O. S. Purdy Electrical Store in Pasadena, Calif., in telling of his patented star with which an enviable Christmas decoration business has been built.

Hundreds of the stars, such as those pictured on the right, have been sold in Pasadena and surrounding territory for community, club, church and individual trees. The stars vary in size from 6 in. to 18 in., but an 11-in. star leads in sales. They are made 3 in. thick, the outer wall of tin. The two flat sides are walled with colored celluloid, red on one side and green on the other. A 25-watt light is used in the smaller stars, a 40-watt lamp in the larger. Large white stars, called "Stars of Bethlehem," are placed on rods and raised above the trees. The rod usually is invisible, so the star seems to be balanced in air.

"By selling the stars at $1.95, we are able to realize a fair profit. The price includes the wire attachments, cord and lamp," said Mr. Seaton. "We do not intend to sell these only during the Christmas season, however, for many business and manufacturing firms use stars in their advertising, as do many fraternal organizations. But the Christmas demand has been so large that we find ourselves supplying other electrical dealers with stars."

Exhibits of eight makes of refrigerators occupied a section 20 ft. wide around the tent at the electric refrigeration exposition at the California State Fair

Carnival Selling

With Manufacturers as Ringmasters, With Newspapers as Spielers, With Other Appliances as Sideshow Attractions, Refrigerator Dealers and Distributors Put on Good Shows and the Public Buys

NEW success stories keep pouring in, this time about local exhibits sponsored by local refrigeration bureaus under the national bureau plan. In no case reported to ELECTRICAL WEST has there been a note of discouragement; every showing has been thronged with visitors and every organization already is or expects to be over quota by the end of the year. In some localities, the national "5 per cent goal" probably has seemed a trifle conservative. Following are four new reports.

In Phoenix, Ariz., the Electrical Refrigeration and Radio Dealers' Assn., a new organization, sponsored a national Refrigeration Week Show. Leading electrical refrigeration and radio dealers of the Salt River Valley arranged attractive displays of fall novelties of standard design in nationally advertised products, and the food industries were represented by numerous booths and many attractive demonstrations. Musical programs were arranged by the radio dealers.

Eighteen thousand people visited the show between Wednesday and Saturday and no one failed to get some angle of the program on food preservation for health and economy, which was the keynote of the exhibit. Speakers discussed this subject in all phases and there were endless demonstrations of recipes, menus and short cuts to domestic economy.

This show is to be an annual event under the direction of the Dealers' Association whose officers are: O. W. Watkins, Frigidaire representative, president; Sam Kahan, of the Electric Equipment Co., Kelvinator distributors for the state, vice-president; and J. S. Arnold, Central Arizona Light & Power Co., secretary-treasurer.

In Denver, Colo., an exhibit was sponsored by the Electrical League of Colorado, working hand in hand with the N.E.L.A. Divisional Refrigeration Bureau, and with plans to become a part of National Refrigeration Week. It was held at the Cosmopolitan Hotel with 35 units being exhibited by the Public Service Company of Colorado and seven other local distributors.

Newspaper advertisements and extensive radio broadcasts financed jointly by the participating exhibitors drew the public's attention to the event. The Public Service Company devoted space on 36 billboards to publicize electric refrigeration without reference to any particular make of machine. The utility also distributed scores of automobile tire covers with the slogan "Invest in an Electric Refrigerator."

Dr. B. B. Jaffa, health commissioner for the city and county of Denver, opened the show with a speech in which the vital importance of proper food refrigeration was emphasized. Noted domestic science experts were present to give lectures and demonstrations on food, its preservation and preparation. Vocal and instrumental music provided entertainment features.

Although a detailed record of immediate sales is not available, it is known that a number of visitors to the show purchased refrigerators. Additional patronage came from those sixteen guests whose attendance prizes entitled them to certificates worth $25 as first payment on a new refrigeration unit. All visitors were registered and cards bearing their names were allotted to cooperating exhibitors. From this group has been pruned an unusually large number of real prospects.

So gratifying were results that a cooperative effort along more comprehensive lines, to include appliance dealers throughout the entire Rocky Mountain region, is in progress.

Among the exhibitors were Otto Equipment Co., Norge; Columbia Stores Co., Mohawk; Frigidaire Sales Corp.; Intermountain Appliance Co., Westinghouse;

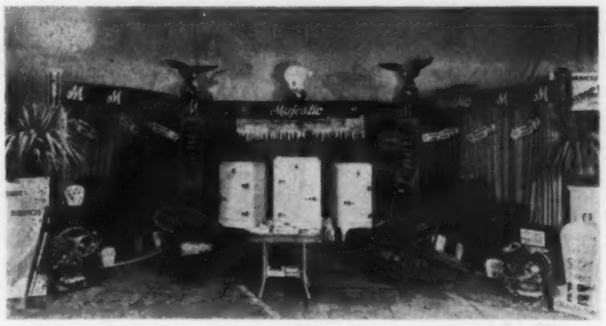
Between 48,000 and 50,000 persons visited the tent during the fair week and nearly 7,000 attended the 24 refrigeration classes conducted

Moore-Bird & Co., Majestic; B. K. Sweeney, Inc., General Electric; Winter-Weiss Co., Servel; and the Public Service Company of Colorado, Kelvinator.

Besides the Denver show, about 25 other electric refrigeration exhibits were held in the Rocky Mountain Division (Colorado, New Mexico and Wyoming) prior to and during Electric Refrigeration Week.

In Sacramento, Calif., at the California State Fair, an eight-day show was promoted by the Pacific Gas and Electric Co. and General Electric, Frigidaire, Kelvinator, Norge, Servel, Copeland, Mayflower and Majestic dealers and distributors. The exhibit and show were housed in an 80 x 80-ft. tent with a 24 x 12-ft. platform at one end. Benches to seat approximately 300 people were provided in the center space facing the platform and the refrigerator exhibits occupied an area 20 ft. wide surrounding the tent on three sides.

Special food and refrigeration classes were conducted three times daily, at 1:30, 3:30 and 8:15. The school was handled by Mrs. Mona VanDyke, of General Foods Corp. Mimeographed recipes were given each visitor at the class and door prizes were presented after the last two classes of each day. To get the visitors to view the exhibits, Rainier Lime Rickey was frozen into



Booth at the first annual electrical refrigeration and radio dealers' show in Phoenix, Ariz., managed by W. C. Lefebvre

cubes by all the exhibitors and given away free. This was a happy idea and had a fine promotional effect.

Inside the tent a public address system was installed and a loudspeaker arrangement placed outside to cover the main portion of the fair grounds. Announcements could be made to all the grounds by this system and music was broadcast during the intervals between classes.

Total attendance was placed at between 48,000 and 50,000 for the eight days. Between 6,500 and 7,000 persons attended the 24 refrigeration classes. Individual distributors sold four or five dozen boxes and got 815 good prospects. One participant expects to sell 100 boxes to his list by Jan. 1. In only one case were sales less than last year.

Rodney Doerr, P.G. and E. representative who arranged for the show, believes that with an inside housing and a location farther from the entrance to the fair grounds, the show would have been an even greater success. Such arrangements were impossible this year, however.

Eugene, Ore., furnishes an example of putting across the national refrigeration program in a small community through the cooperation of refrigeration interests. Here the national quota based on 5 per cent of the domestic customers amounted to 270 units, and, from the time the campaign opened in March to the end of September, eight dealers had sold 235 machines. There seems little

Exhibit of Denver dealers and distributors under the auspices of the Electrical League of Colorado. Eight makes were shown

doubt that quota will be reached and passed by the end of the year.

The "how" of this accomplishment centers around the cooperation secured from the refrigeration dealers by the Eugene Water Board, which manages the municipal power utility operating in Eugene, with C. A. McClain as general superintendent, and F. M. Bennett, manager of the public relations department, in charge of the Board's cooperative activities.

Cooperation from the dealers was stimulated, no doubt, by the fact that the Water Board agreed to put up all the money for general promotion up to 10 c. per meter for the 7,000 customers of all classes, or $700. A simple calculation shows that a five per cent refrigeration saturation will have been added to the lines of the Eugene system at a promotion cost of not to exceed $2.60 per machine. A stipulation connected with the Board's agreement to spend $700 in promoting refrigeration was that the dealers would agree to keep at least five salesmen in the field during the campaign period.

In addition it was understood that the dealers would advertise the particular machines they had for sale, though no definite volume of such advertising was stipulated. The advertising departments of the local newspapers were confidently relied on to stimulate such advertising and were a factor in securing a considerable volume of it for inclusion in space adjacent to that allotted to the general advertising of the Water Board. The promotion fund of the Board was spent in approximately the following proportion: newspaper advertising, 50 per cent; radio, 20 per cent; billboard, 15 per cent; direct mail, exhibit and miscellaneous, 15 per cent.

All refrigeration dealers in the city were invited to display one model of the make they were selling at the Lane County Fair, in space provided by the Water Board.

One of the booths at the Vallejo (Calif.) cooperative show. The attendants at the booth are shown

The only expense of the exhibitors at this display was the expense incurred in moving a machine in and out of the fair grounds and supplying a card showing the name of the exhibitor. The booth had no attendant, the appeal being a visual one only, but visitors were permitted to pass through the display and inspect the merchandise there shown. A clever interest-arousing device was supplied mechanically. Air was refrigerated in the back of the booth and blown by fans outward toward the aisle so that passers-by were treated to a cooling draft that invariably arrested their attention and directed it toward the exhibit.

Eugene's Water Board is well pleased with the results of the refrigeration campaign to date, and, in fact, with its general policy of promoting the sale of electrical appliances through dealers, which does not vary greatly from the plan put into effect for refrigerators this year. In other words, the Board does not merchandise actively, but has since 1929 carried on a certain amount of promotional advertising by radio, newspaper, and bill boards, asking in return that the dealers in the devices advertised supplement this with their own advertising of the specific makes handled. Most of this promotional effort has been directed toward the sale of electric ranges of which there were 1,700 in use by the 5,700 domestic customers in the city at the end of 1930. The average annual kilowatt-hour consumption per domestic customer in 1929 was 1,400, and in 1930 was 1,530, including flat-rate water heating, of which there are 1,200 installations. The Board reports that their range customers average 1,760 kw.-hr. per year, exclusive of water heating, as against 410 kw.-hr. per year used by the average domestic customers not having a range.

No merchandiser, the Water Board displayed all makes alike, promoted sales for all dealers

CONCERT MAY 15
. . . even a pup—could tend an electric refrigerator
Low Prices
$187.50
the new SERVEL HERMETIC
POWERS OFFER
A 5 YEAR GUARANTEE WITH EVERY
KELVINATOR
A SIZE AND PRICE FOR EVERY PURPOSE
— PAY AS YOU EARN —
IRA F. POWERS FURNITURE CO.
QUICK FACTS
COME IN AND SEE THE NEW SERVEL HERMETIC
WHITE-MARLATT CO.
EUGENE BADDO CO.
Refrigerate the Electric Way
It's Safe Sure and Clean
EUGENE WATER BOARD

Flanking Eugene Water Board advertising were displays by dealers named in the Board's general advertisement

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"Today's Opportunity" Session Summarized

Some of the Business Building Developments in Which the Electrical Industry May Profit Are Recounted at a Commercial Section Meeting

"A LOT of perfectly good nails will be driven deep into the problem of getting more business at this round-table discussion session," said Harry Carroll, vice-chairman of the Commercial Section, P.C.E.A., at its recent Los Angeles conclave. "We'd like you to end up the morning meeting by clinching them down on the other side. After the discussion is over we shall need comment and a summary of what was said."

With these instructions, one of the editors of ELECTRICAL WEST made complete notes. The summary was to be verbal, at the end of the meeting. But the subject which closed the day, merchandising, proved so engrossing that noon came and no time remained for the summary. But because the discussion that morning was replete with genuine business building ideas and indicated definite trends in commercial possibilities of all kinds for dealers, wholesalers, manufacturers and central station men, that summary is presented here.

Three topics were set forth under the general heading, "Today's Opportunity." First was "In Lighting Development," started on its way with an outline by Leo G. Gianini, Edison Lamp Works, San Francisco. His outline was so comprehensive and worth while that it will be published in full in the January number of this magazine. Next came a survey of opportunities and problems, "In Power Development," launched by R. C. McFadden, Southern California Edison Co. Ltd. . A final discussion of opportunities, "In Domestic Load Development," was begun by H. H. Courtright, Valley Electrical Supply Co., Fresno, and ended far into the noon hour. For purposes of briefness the summary of thoughts presented will be listed without details or authorship. The viewpoints represented include those of men in all phases of activity,—contractor-dealers, wholesalers, manufacturers, and commercial executives of power companies.

IN LIGHTING DEVELOPMENT

(Practically all of this subject will be dealt with in Mr. Gianini's paper next month.)

Artists are needed in the lighting profession, men who envision its possibilities and can plan it on a basis of basic human reactions to light. It is a matter of knowing psychology, knowing the process of seeing, of intensive training of men who sell as well as men who buy.

Cold light, through gaseous tubes, for other than decorative uses, is still remote. Really white light from gaseous sources is not cold, still involves power factor correction improvement. There is much research in this direction.

Through all runs the basic question: Is the utility interested in the customer from the service it can render him or merely from the load it can get from him? Many important decisions and promotional efforts hinge upon a definite commitment on this point.

In Power Development

No field of power application is saturated. The moment it is considered a sure thing, somewhere there is uncovered a competitive power source which threatens its place.

Careful analysis of the market brings surprising potentials to light. An example is the oil field survey, showing that of the total power used, 189,000 hp. is electric, 287,000 hp. steam, 248,000 hp. gas engine, and only 800 hp. diesel. Thus 25 per cent of the oil industry is electrified. The much promoted diesel seems to have little consideration from those who supply fuel for its operation for others.

Air conditioning offers the most promising new power load. Even the home will soon be offered smaller air conditioning units. Industrial and commercial air conditioning advances apace.

Even orchards get air conditioning of a sort by means of a windmill that makes its own wind, a 100-hp. motor driving an airplane propeller which stirs the dead chill air during freezing nights, and brings down warmer currents to temper the atmosphere and prevent fruit from frost-bite. The soot-laden, filthy air of smudge pots is eliminated for from 10 to 15 acres per revolving windmill. Homes in the entire area are kept clean.

Utilization of the great natural gas surpluses approaches with the new southern California pipe line from Kettleman. Good news to power men.

Loading oil ships electrically saves $70 per hour. Lighter gravity oils are being pumped electrically, opening the way for electrified pipe lines.

Shredded alfalfa brings $30 a ton from $8 per ton grass, costs only $3 a ton to grind. It may even find its way to the human breakfast table, replace spinach. Another trial for the small boy.

The industry is too complacent about diesel engines. Newest European engines show high efficiencies. Any load of 40 per cent load factor, at a rate of over 7 mills, is open to diesel competition. The electrical industry must look to its commercial lighting loads. Unemployed engineers, idle machinery factories, installment finance companies, make competitive bedfellows for the sale of engine plants.

Citrus sweating now proves to be a supersaturated air conditioning process, employing steam from open tank water heater installations. Thus is combined electric heat, hot water, and fans, on continuous operation.

In Domestic Load Development

A conservative estimate avows 4,000-kw.-hr. per year domestic consumption to be reasonable home use of electricity. Even 2,000 kw.-hr. average would seem a paradise of commercial achievement where few companies now reach 1,000 kw.-hr. per year average.

The non-tarnishing, hard-surface chromium finishes are the boon of modern appliances. Interesting recent developments in appliance design include percolators of glass or crockery, heat regulation on waffle irons, automatic toasting selling the toaster because of the toast, duraluminum hand irons weighing but half a pound, mixers and juice extractors of every description and combination, improved vacuum cleaners, washing machines sans wringers, electric clocks with ingenius time operated adjuncts, sun lamps for office as well as home, new gases developed for refrigerators which, like many of the usages of refrigerator-made ice, "may be drunk or put in your eye" with safety.

Electric kitchens complete, including with the range, refrigerator, water heater, and dishwasher even a garbage incinerator and tin can flattener, are not far off. They will be sold in complete units to new homes or to the remodeled old home.

Water heating tends toward the storage type, off-peak operated.

Gas range design is catching up with electric range features, is forcing manufacturers to new improvements.

Guarantees should be f.o.b. point of service; the dealer and user should no longer be used as an experimental station for the manufacturer. Competition with other industries will be greater than ever. Price wars are ominously portended.

The electrical industry is like a circus parade, its tinsel growing shabby, its band tunes old fashioned, its sure fire features a bit stale. Competing parades are attracting the multitudes to other streets. The electrical industry must do a good sales renovating job on its parade. The public must be attracted back to its modern music and strange new animals.

Today's housewife is *some* purchasing agent. She knows more about the product than does the salesman. Salesmen must get back at least to an even footing.

A new Kangaroo for the parade is the small unit air conditioning plant giving 750 cu. ft. per min. of air movement, providing 1 ton of refrigeration, operating on 1½ hp. Home ventilating fans, too, offer attractive loads, up to 1 hp. in large residence kitchens. Furnace fans to boost the circulation of sick furnaces also offer a breezy market.

Contractor-dealers of ten years ago sold wiring in order to sell appliances. Today, said one, the appliance sale brings the wiring. Soon the contractor-dealer must decide whether he is merchant or engineer, and specialize in one or the other field.

If the public had been asked to buy lamp bulbs instead of apples, they would have bought lamps from unemployed. There is no harm in asking the public to buy, and buy.

Utilities should not dominate the field too greatly, should do much cooperative advertising, promotion, must lead without bumptiousness, establish and set an example of standards in ethics and quality.

There is danger in price obsession. Quality is still necessary and can be sold. The market for it is just as good a market today as ever.

Whereas construction during the 1923 peak was 200, each year it has slid down until today it is 35. The future market of the industry lies in equipping present homes with complete electrification.

The Pacific Coast Electrical Bureau appliance committee starts its first sales school in five centers of population in southern California. All who contact the public in all branches of the industry are to be urged to attend, learn to sell the electrical idea, from a specially prepared electrical sales course.

Wiring is not the answer to range and water heater selling. A specialty sales set up is nearer right.

It is no time for sangerfests, singing praises to achievements. Of the 70,000 pieces of cooking equipment sold yearly only 5,000 are electric ranges.

Any plan to be successful must cultivate the dealer's assistance and take him with the central station on the program, but central stations cannot yet relax their selling efforts one iota. The job is too big.

Instituted for Light and Vision

Classes in Lighting Theory and Practical Sales Methods Conducted by Representative for Benefit of the Entire Industry

First of a series of groups to take a special lighting course under Frank O. Hansen, seen standing, baton in hand, was one composed of wholesalers', power company and contractors' salesmen. Later came a contractors' course, soon one for architects, and another for optometrists is planned

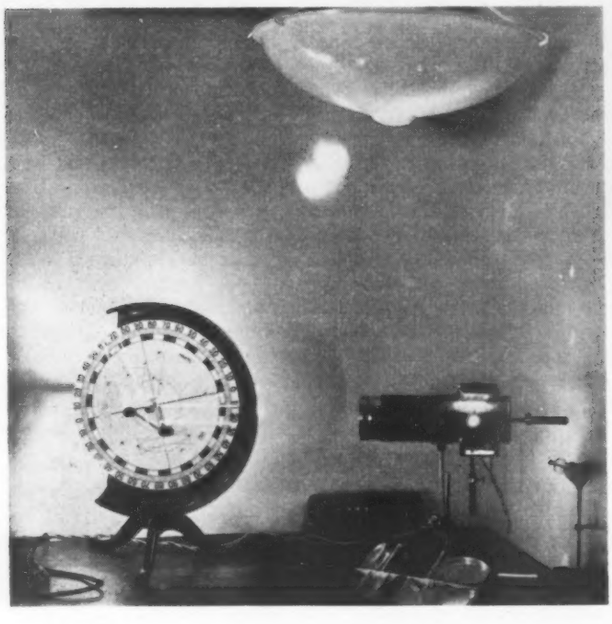
TWO classic remarks have distinguished Frank O. Hansen, division manager, Holophane Co., Inc., in addition to the many other things which he has accomplished on the Pacific Coast. The first has been reduced to a slogan, or better still, an axiom: "Every good lighting job sells six more." The second explains a philosophy which shows no fear of price competition: "My price was so much higher that there was no use coming down, so I went ahead and sold the job on its merits."

This thing of selling jobs on their merits is a quality which he has made arrangements to share with the electrical industry. Thereby the six new jobs for each good one sold will accrue to whoever learns the technique. Learning the technique first implies knowing how to plan lighting to fit specific needs and then translating that knowledge into the customer's point of view.

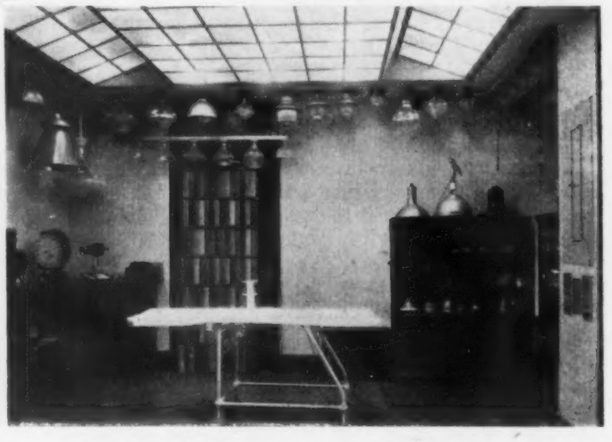
Reduced to a specific case—take a shoe store, out in the outskirts of town for instance.

"Appreciate the owner's problem," says Mr. Hansen. "This store, most likely, represents everything the man owns in the world. Put yourself in his shoes. Look at the problem of his lighting from his viewpoint. In the old days, which formed our electrical background, the man who wanted anything electrical came to us and asked us to figure on some lighting for him. That situation did not demand salesmanship. Worse, it prompted a sort of 'high hat' attitude toward him and his problem that will not do today. After getting the man's viewpoint, the lighting should be carefully planned to do for him what he needs. The lighting man should think out all the reasons. There are reasons for making every single proposal. Then the salesman should approach the customer from the standpoint of wanting to render him a sincere service. Sincerity is very convincing. Nothing takes its place. So many installations are just 'put in,' without thoughtful consideration. Give good measure. Hold nothing back. Give more than is expected in service. That's what I call a real sales idea. I know it works."

Chiefly interesting is the fact that by means of the light and vision institute which that company has been building up ever since it moved its offices from the Call Bldg. to the Russ Bldg. in San Francisco, Mr. Hansen is teaching the electrical trade these principles of selling.



Left—One corner is devoted to special light demonstration equipment, among which is the Hartle optical disk. On it various types of lenses and mirrors can be mounted at any required angle, the light being directed at them at any angle, and the effect clearly indicated on the disk



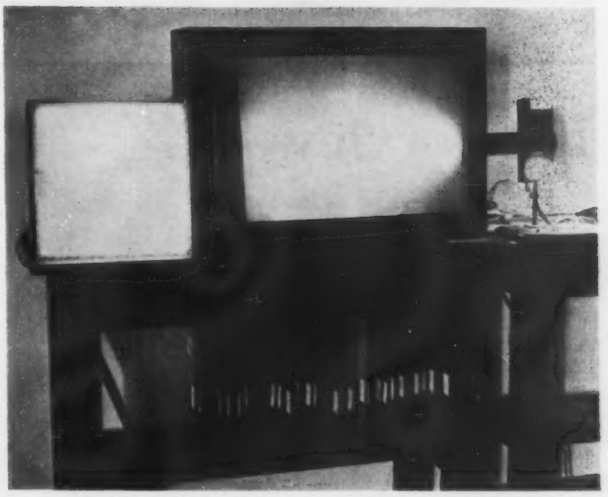
Above—Hospital operating room ceiling bank, various types of outdoor, indoor, and industrial lighting "specifics" mounted so that they may be demonstrated, and cabinets containing other types of special lighting glass, occupy a portion of the institute. A stack of "books" illustrates library stack lighting. At one side are outdoor airport and substation lighting units. A special switching panel was installed to care for the lighting needs of this institute

The institute was established to provide a field laboratory open to the use of the electrical trade, the architect, the engineer and the public, wherein to test and try various lighting "specifics," or especially designed glassware under as near actual operating conditions as possible. Illustrations on these two pages indicate the range of equipment installed in the institute. Space does not permit of a full description of all of it and of the purposes it serves.

It is what is done with the equipment that is important. With these facilities Mr. Hansen has begun a series of educational classes for groups of contractors, architects, optometrists, any group which evinces an interest in lighting. The first of these courses ran from Aug. 31 to Sept. 21, two nights a week, from 7 to 9 p.m. The course consisted of six lectures, carefully worked out to give the person attending a comprehensive appreciation of modern lighting and its design. Attendance was limited to 25; no fees were charged.

Photometer equipment, a blackboard to illustrate built-in ceiling lighting plates, a cabinet of special lighting units, and a shadowbox line the wall. The latter is divided into compartments to illustrate (1) colored light on colored pigments, (2) colorama effects, (3) glare, (4) shadows, (5) speed of vision, and (6) shadows on form. The latter will have architectural forms in it to show shadows created by downward or upward lighting. Below these are boxes which demonstrate the same lamp with and without reflectors. In the ceiling are flush-mounted window lighting units, a psychopathic ward unit with shatter-proof glass, and an office indirect unit. In the foreground is a substation lighting pedestal standard

The main purpose of the courses to the trade is to remove fear from the salesman's mind by giving him a working knowledge of the fundamentals of lighting. With some self assurance the salesman can more readily at-



Of service to architects in helping them determine the effectiveness of various commercial window and skylight glasses is a smoke box in which a light beam is directed at samples of these glasses. Thus the resultant distribution, diffusion and direction of light is clearly indicated. Another handy device (left of the smoke box) is a light box over which such glass may be placed so that its appearance to the eye may be demonstrated

tempt to deal with a lighting problem. In all of the work Mr. Hansen has been careful to make the course one of fundamentals and not of products, bringing out the advantages of other equipment than that handled by his company.

Briefly, the course is composed of six lectures, taking up in order the following subjects:

1. Relation of light and the eye, fundamental principles of illumination, light sources, illuminants, terms, laws, principles of photometers, reading of distribution curves.
2. Principles of light control, involving all materials and media for redirecting light.
3. Lighting calculations and the various practical methods employed. A typical interior lighting plan is developed.
4. Review of lighting fundamentals. A practical store lighting and an office lighting problem are solved.
5. Lighting and the industrial plant. All important areas of a typical plant are planned by the class.
6. Miscellaneous applications, such as hospital, institutional, airport, floodlighting and outdoor lighting. Light and architecture. Lighting economics. Lighting sales.

An interesting feature of the classes was that the first 15 min. of each evening were devoted to general discussions and questions, rather than the usual last part of the meeting. Attendance at the classes has been remarkable. The second series of classes, held for contractors and estimators, was given both in San Francisco and Oakland concurrently, on alternate nights. Both groups attended faithfully and increased as the series progressed. Similar courses for architects and optometrists are in contemplation.

Another educational feature undertaken by this institute is the presentation of lighting talks before other groups. Not long ago Mr. Hansen addressed a meeting of grocers at a southern California food show.

Like his slogan, "Every good lighting job sells six more," this missionary of lighting finds that "every good lecture brings six more," and each lecture brings a better understanding of lighting to the trade and the buying public.

Harborview Hospital

For the Comfort and Convenience of the Patients and for Increased Efficiency of The Staff, Electricity is Employed in Seattle's New Medical Center

By M. J. HAUAN
Sanitary and Mechanical Engineer,
Thomas, Grainger and Thomas, Architects
Seattle

SITUATED high on a hill commanding a magnificent view of Seattle and Puget Sound stands a group of buildings which symbolize the medical progress of that city—the Harborview Hospital. This medical center consists of the main hospital building, a nurses' home providing living quarters for 200 nurses, a central heating plant, a shop building and a laundry. The main hospital building rises ten stories above the street level, having a capacity of 421 beds. All floors above the first are devoted to patients' rooms and wards with the exceptions of the seventh and eighth floors on the south wing where the main operating and obstetrical departments are located. In a central tower rising four stories higher than the main building space is provided for water tanks, elevator equipment, ventilating equipment and supply and exhaust fans. Two full stories below Ninth Ave. are devoted to the main kitchen, dining room, receiving department and general storage. Total cost of the project, not including loose equipment, was $2,167,908.

DISTRIBUTION

Throughout the hospital electricity has been utilized to bring comfort and convenience to the patient and to increase the efficiency of the hospital staff. Electrical service is brought in through two transformer vaults, each set from independent substations but so arranged that the total load may be carried on either vault in case of emergency. One transformer vault in the basement of the hospital building serves that structure, and the other adjoining the Nurses' Home serves that building, the heating plant, shop building and laundry. Secondary leads from the transformer vaults are brought to deadfront switchboards for distribution to lighting and power panels on each floor. The main switchboard in the hospital building feeds two sub-switchboards at the base of two electrical riser shafts, which are located at the quarter point in the length of the building.

Harborview Hospital

All switchboards are dead-front, safety type, with all-steel enclosure. The individual panels of each switchboard are independent sections bolted together upon 1½-in. angle-iron uprights and mounted on a 4-in. horizontal channel imbedded in concrete flush with the finished floor with flanges down. The front is made of No. 10 U.S. gage cold-rolled furniture steel.

The three-phase, four-wire system of distribution was used for feeding the sub-switchboards, whence individual feeders are run up each riser shaft to their respective floor panels in single-phase, three-wire, 110-220-volt services to feed the lighting and power branch circuits. Separate lighting and power panels were provided on each floor, all being dead-front, sectional, unit type. The lighting panels are so constructed that any switch or double branch circuit may be removed or replaced independently without disturbing the busbars or other portions of the panel. Single-phase power panels are arranged so that any branch circuit may be interchanged on buses for either 110- or 220-volt service without removing the panel or disturbing the busing or circuit wiring.

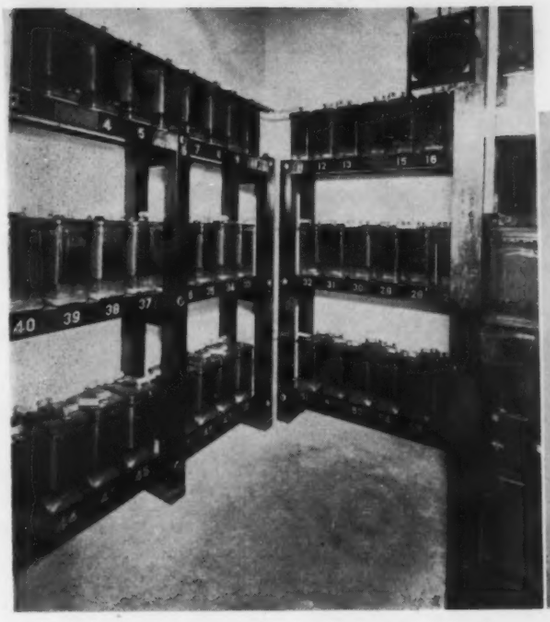
All panels are installed in galvanized steel cabinets of the safety, dead-front type. Cabinets for the lighting panels are of door-in-door construction, with the inner door closing over the switch handles only and equipped with latches, the outer door closing over the fuses and equipped with cylinder locks. Gutters 3 in. in width entirely surround each section of the panels. Switchboards, panels and cabinets were manufactured and assembled in the shop of the electrical contractor, NePage McKenney Co., Seattle.

No. 14 wire was used in wiring all lighting circuits, heater and power outlets up to 2,000 watts being wired with No. 12. Special 20- and 30-amp. heavy-duty power receptacles are provided in all utility and treatment rooms for use of portable equipment such as sterilizers, X-ray machines and special lamps.

HEATING AND VENTILATING

To serve the various mechanical processes such as fan motors, water pumps, elevators, compressors and vacuum pumps required a total of 500 hp. in three-phase, 220-volt motors. Heating is accomplished by a Dunham low-pressure, vacuum return system. Steam is supplied at 100-lb. pressure from three coal-fired, 200-hp., water cooled boilers with automatic stokers. From the boilers an 8-in. high-pressure steam line runs to the hospital and to the nurses' home, where the pressure is reduced to 60 lb. for sterilizers, 20 lb. for hot water tanks and Aerofin heaters in the ventilating system, and 2 lb. for distribution to all radiators.

In the hospital building steam is conveyed in separate heating and sterilizing mains to the tower previously mentioned, and is distributed in downfeed risers. Steam at 20 lb. pressure is taken from the main heating riser in the tower space and utilized for the Aerofin heaters.

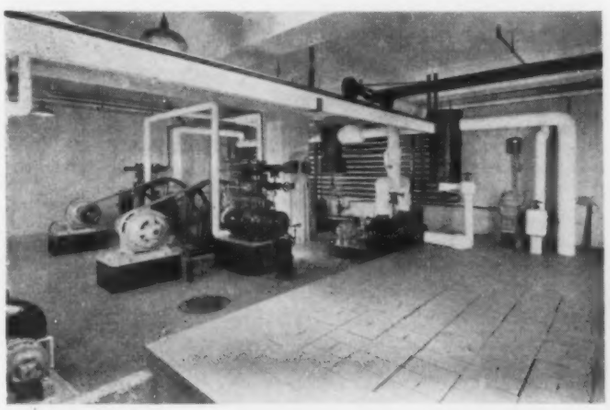


Main switchboard and automatic throw-over panel for emergency lighting circuits which are energized from the storage battery installation shown on the left

The hospital building is divided into four sections with an air-operated control valve for heating each section. The shutoff switch for each section is located in the steam distribution room in the basement of the hospital, where are also duplicate vacuum pumps.

In general, the radiation installed is sufficient to heat all rooms to 75 deg. F. with a minimum outside temperature of 15 deg. F. In rooms where temperature control is installed, the radiation is sufficient to heat to 85 deg. F.

In conjunction with the heating system, the hospital building is provided with an exhaust and fresh-air supply ventilating system. In two masonry shafts located at the quarter point in the building, supply openings for each floor are provided through grilles in the corridor walls. Doors leading to each ward or utility room are provided with adjustable metal louvers. Air forced down the ventilating shaft into the corridors passes into the patients' rooms and out through the exhaust ducts which are provided in all toilets, utility rooms, closets or rooms with no windows. Separate exhaust systems are provided for operating rooms, X-ray rooms, physical therapy rooms, kitchen, dining rooms and isolation wards. The fifth floor, which is used for psychopathic patients, is provided with a thermostatically controlled system of heating through ceiling supply grilles. Supply and exhaust fans for the ventilating system are located on the different roof levels of the buildings and driven by three-phase, 220-volt motors with magnetic push-button control. Some of the control stations are located near the motors, while others, controlling the exhaust fans for the kitchen, operating rooms, isolation wards, X-ray rooms and kitchens are placed in convenient positions in their respective departments.

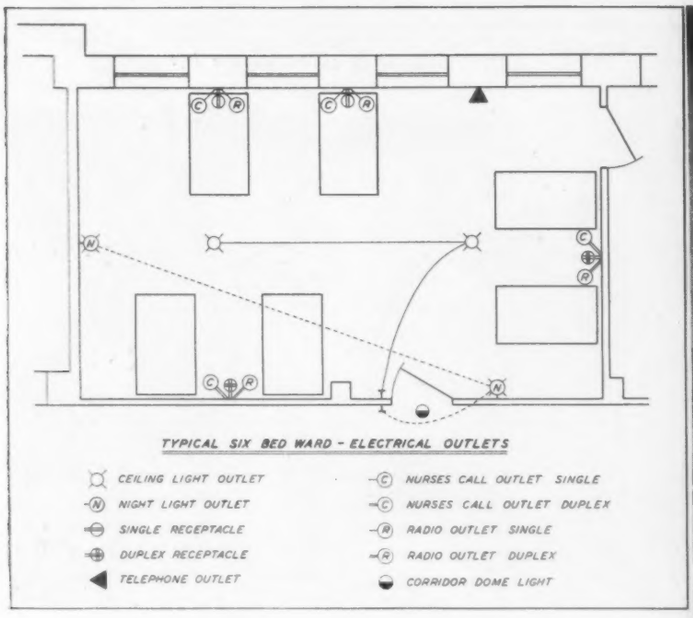


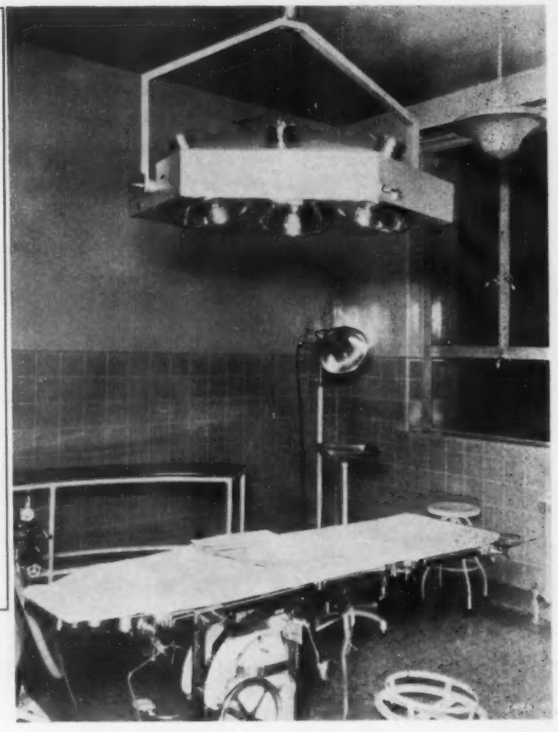
Refrigeration equipment. Short-center drives on the compressor and individual motors for other equipment emphasize cleanliness and accessibility of the installation. Right—Diet kitchen equipment typical of all good preparation rooms in the hospital. Cooking, baking, refrigerating and warming are performed electrically.

Refrigeration and Water Supply

In the basement an 18-ton-capacity, brine-circulating refrigerating plant is installed. The plant provides refrigeration for ice-making, ice cream freezing, drinking water cooling, mortuary, garbage storage, ice storage, and all main kitchen and diet kitchen refrigerators on the hospital ground floor. Two refrigeration units, each capable of developing 10 tons of refrigeration for 24 hr. and using carbon dioxide for a refrigerant are installed. These compressors are connected to standard 30-hp. induction motors through V-belt drives. Where relatively small capacities are required in various diet kitchens and laboratories, General Electric refrigerators are installed.

Water supply for the hospital is pumped from the city mains to two 12,000-gal. storage tanks mounted on the fourteenth floor of the tower. A 1,200-gal. flush tank





Above—Typical six bed ward layout of lighting and electrical circuits. Right—Electrical fixtures in an operating room

fed from the two main tanks is also installed but the flush water system is entirely separate from the main cold water supply piping. Hot water is supplied from two 1,500-g.p.m. combined storage and hot water service heaters located in the basement of the hospital. One serves the upper floors of the hospital and the other the lower floors. A hot water booster is used for kitchen service.

Drinking water for the fountains and diet kitchens is cooled in a special insulated tank, cooling 100 gal. of water per hour to 45 deg. F., using brine from the main refrigerating plant. Ice water is distributed in cork covered mains.

Cooking

Food is prepared almost entirely by electricity. In the main kitchen there are four 22-kw., three-phase, 220-volt ranges and one 5-kw. electric broiler. In the main diet kitchen there are two 9-kw. ranges and one 5-kw. broiler. Various small diet kitchens on each floor are equipped with hot plates of from 2 to 3-kw. capacity.

Baking is accomplished in an electric oven of 24-kw. capacity served at three-phase, 220 volts. This oven has a capacity of 180 1-lb. loaves of bread and 18 roll pans at one loading.

The total electrical load for the main kitchen and all diet kitchens is about 175 kw. The larger ranges and bake ovens were ordered wired for three-phase, 220-volt current rather than 110-220-volt, in order to hold down the feeder size to a minimum.

After the food has been prepared, it is distributed to the patients' rooms on each floor in electrically heated food carts having a capacity of 200 watts each.

Illumination

Illumination was given careful consideration in the design of this building. Five foot-candles was considered a good value of illumination in the wards, while ten or twelve foot-candles was supplied in the offices. For the operating rooms special fixtures were selected to give a maximum intensity of illumination in the operating field with a complete elimination of shadows and heat. In these rooms auxiliary lights were provided in addition to the main fixtures for use in emergencies or for cleaning rooms. Special sparkless switches were used in all operating-room lighting circuits to protect against the explosion hazard of anesthetizing gases.

Indirect lighting was used throughout in the patients' rooms and the office section of the hospital, indirect fixtures used for general lighting consisting of a spun aluminum bowl with a 500-watt X-ray reflector.

The accompanying illustration is typical of the illumination and electrical connection in a six-bed ward. Two indirect lighting ceiling fixtures are installed. Each bed is provided with a nurses' call outlet, a radio outlet, and a single receptacle. In addition, a separate recessed night light is installed 18 in. from the floor in all wards.

In an emergency, lighting for the operating room and exit stair lighting is provided from a set of storage batteries which are arranged to function through an automatic throw-over switch which places these services on the emergency source in case of failure of the main power supply.

Two passenger elevators, one service elevator and one plunger freight elevator serve the hospital. In addition, three electric dumbwaiters provide food service between the main kitchen and the diet kitchens on each floor. Passenger elevators operate at 600 ft. per min. and are of the duplex collective automatic control type. The service elevator operates at 300 ft. per minute and is of the car switch control type. The freight elevator which provides service between the main kitchen on the ground floor and basement storage rooms is of the plunger electric type with full push-button automatic control.

A central fire alarm system was installed consisting of "break-glass" stations on each floor with annunciators located at the telephone operators' room, engineers' room and medical directors' office. Closing the circuit at one of these stations automatically relays the alarm to the central fire department station. These auxiliary alarm boxes are of the positive return signal type which indicate through a low sounding buzzer to the person pulling the box that the alarm has gone into headquarters. The buzzer is not audible for a distance of more than 10 or 15 ft. The boxes are equipped with automatic

switches which operate the annunciators and gong continuously until the switches are intentionally thrown off contact. Gongs are installed in the Nurses' Home and in the sleeping quarters of the hospital employees. Save for the slight sound of the return signal, this system is noiseless, one single operation doing all the necessary things in connection with the outbreak of a fire pending the arrival of the fire department.

Another electrical feature which aids the staff of the hospital is a complete paging system capable of paging three doctors simultaneously. A self-regulating impulse type electric clock system also has been installed. Second-beat secondary clocks are installed in all major operating rooms.

Architects for this structure were Thomas, Grainger and Thomas, Seattle. The electrical contractors were NePage McKenney Company, also of that city.

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Prequalification Of Bidders Urged

CAUSE of more chaos than almost anything else in the contracting industry, is the practice known as "going in over his depth." The contractor of established business reputation, with organization, experience, finance and other qualifications, finds in competition with himself not others of his own class but scores of too ambitious contractors of less experience and standing who hope to break into bigger work with a big job. So often have these men taken the work below cost, long before found to be necessary by the larger contractor, attempted futile measures to recoup, lost all they themselves had and embroiled the wholesalers from whom they purchased, until the latter often have had to take over the contract and bring in others to finish the job in order to save something from the wreckage, that steps are being taken in many quarters to stop the practice.

Notable in this direction, although not affecting the electrical contracting business as yet, is a recent action of the division of highways of the state of California brought to the attention of this magazine by J. O. Case, manager, Quality Electric Works, Los Angeles. Similar legislation was recently passed in Nevada. Both require the filing of a financial statement and filling of a questionnaire by which the division may determine the contractor's fitness to attempt the work upon which he bids. This information acts as a prequalification arrangement by which a contractor is measured before he is accepted even as a bidder on the work.

Under such a plan only contractors of equal qualifications submit proposals and when bids are opened there is no question as to the ability of the lowest bidder to perform the work. It is a practice satisfactory wherever used and unquestioned by those who are parties to it.

For electrical work at Boulder City and Hoover Dam the standard government form of invitation for bids contained a clause as follows:

"All prospective bidders are hereby notified that, before any bid submitted in response to this invitation is considered for award, the government may require the bidder to submit a statement in detail as to the previous experience of the bidder in performing similar or comparable work and of the business and technical organization and financial resources and plant of the bidder available and to be used in performing the contemplated work. The government expressly reserves the right to reject any bid on which the facts as to business and technical organization, plant, financial, and other resources, or business experience, compared with the work bid upon, justify such rejection."

Such a requirement on all large work on the part of architects, engineers and owners, would go far toward the elimination of unsound bidding and inefficient and wasteful attempts to take on projects beyond the capacity of the contractor. It remains for the responsible contractors to sell this idea to the architects and engineers for the betterment of their own business.

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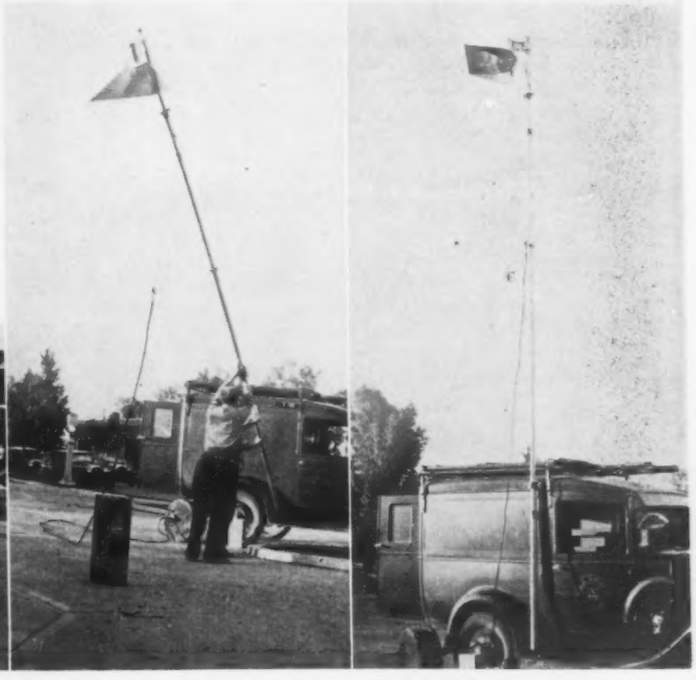
Portable Floodlighting Unit for Demonstration

TO demonstrate the effectiveness of floodlighting, especially to service stations and small stores, the Public Service Co. of Colorado devised a portable unit as shown in the accompanying illustrations. The iron support can be telescoped to produce any ordinary height; lamp sizes are changed as required by the height of the unit in test. Placed on the side of the truck, it can be transported easily from job to job, the automobile also serving as a support for the unit while it is being used.



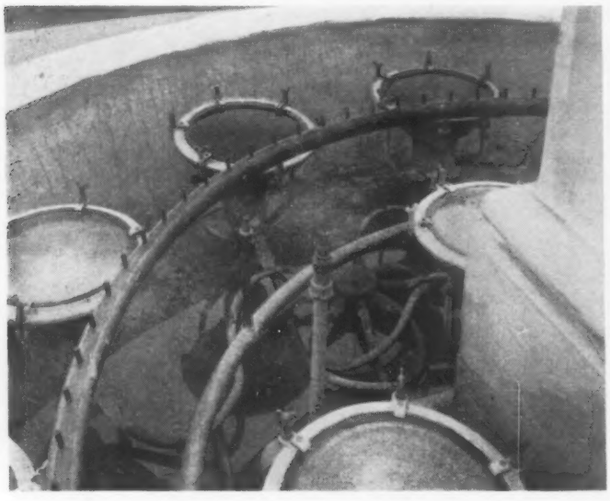
Above and right—Two of the 60 effects possible with the equipment of Beverly Hills' new fountain

Sixty Effects In 8 Minutes

By Lloyd A. Gates
Lighting Specialist, General Electric Co., Los Angeles

BEVERLY HILLS, Calif., has added another touch of beauty by installing at the intersection of the famous Wilshire and Santa Monica Blvds. a mobile-color illuminated fountain, the control of which is completely electrical and automatic. While the beautiful and startling effects of an electrically illuminated fountain are impossible of description, the accompanying illustrations may help to tell the story.

In the general plan the fountain proper is in the center of a splash basin, all of which is surrounded by a tile promenade and benches. Twenty-eight 1,000-watt Novalux underwater floodlighting projectors are used. Twelve of these, mounted in the splash basin and equipped with green lenses to illuminate the housing or pedestal of the fountain, are lighted continuously. Sixteen other projectors are placed in the top basin of the fountain proper, three each being equipped with red, amber and green lenses and seven with blue lenses. These are so arranged that all the water effects are evenly and brightly illuminated. The projectors are constructed throughout of non-ferrous material, with the reflector of glass, silver plated and coated with copper electrolytically deposited.



Section of the fountain proper, showing relative positions of floodlights, jets and spray ring. Sixteen projectors with colored lenses are in this part of the fountain, twelve more in the outside splash basin

In the top of the fountain are eight jets, four sprays and one ring, 7 ft. in diameter, equipped with 80 jets; these create the water formations. There are ten color effects and six water effects which when combined give 60 different combinations of color and water effects within eight minutes. An accompanying photograph shows the relative location of the floodlighting projectors, jets, sprays and ring.

The heights of the water formations are adjustable and vary as desired up to approximately 60 ft. A 200-g.p.m. (at 87 ft. head) pump, direct connected to a 7½-hp., 220-volt, three-phase, 50-cycle motor, supplies the water for the jets, sprays and ring. The water is recirculated, being supplied to the pump from the splash basin surounding the fountain.

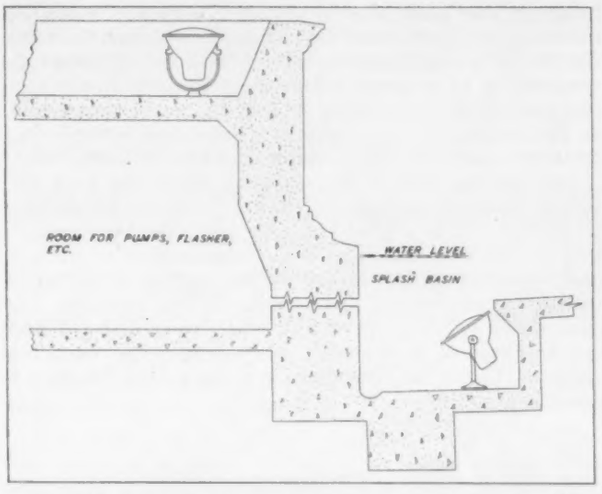
One of the features of this fountain is the method of controlling the water effects, which are adjustable to allow for wind velocity. Three thrustor-operated valves are used, one for the jets, one for the sprays, and one for the ring. These thrustor motors are started and stopped by a motor-driven controller which, with the pump, water valves and magnetic switches, is located in a room directly under the fountain. The thrustor-operated valve for the jets is controlled to give a pulsating effect to the water. This type of electrically operated valve is thoroughly rugged and foolproof, as required for this class of use. The motor-driven controller mentioned also controls the floodlighting projectors to produce mobile color changes in the illumination.

All floodlighting projectors are connected with lead-covered cable and, as all are operated under water, they must be connected to outside atmosphere to eliminate "breathing." "Breathing" is the tendency of the lighting unit to draw water into itself because of the expansion

and contraction of the air within the unit when the lamp is turned on and off. Although the projectors are equipped with two outlets, power and atmospheric air pressure are supplied through the same outlets.

The atmospheric pressure is supplied to the projectors through a ¾-in. lead pipe from a bronze junction box cast in the concrete; the under side of the junction box is open. This lead pipe is also used as a drain for any moisture that might enter the projectors. The power cable is inside the pipe.

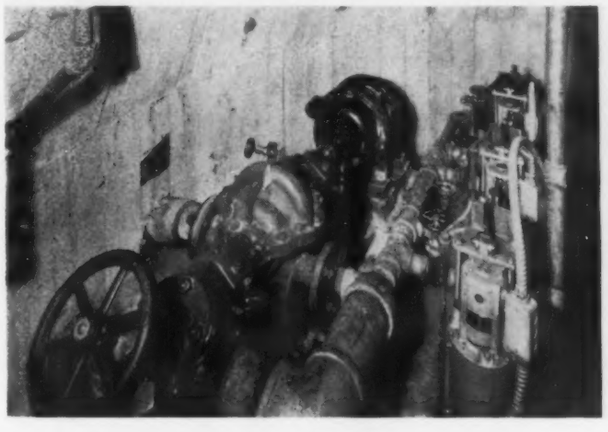
The current supply is divided into two systems: power and light. The 220-volt, three-phase power system supplies the controller motor, pump motor and thrustor motors. A magnetic switch is located close to the pump motor and is operated from the remote control station. The 110-volt, three-wire lighting system supplies the twelve floodlighting projectors around the outside of the fountain through another magnetic switch and the sixteen floodlighting projectors inside the fountain through a third such switch. It also supplies the tunnel lights.

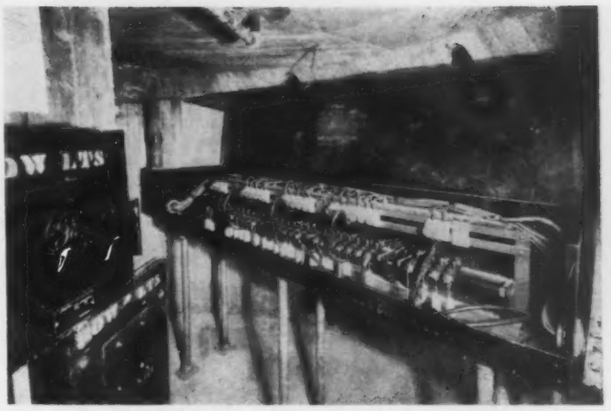


Sectional view showing relative position of room under fountain, splash basin and banks of floodlights. Floodlights are connected to atmosphere to equalize pressure within and without unit to preserve water-tightedness

The operation of the fountain is completely automatic, although manual control is possible. A time switch located in the remote control station starts the water effects at noon each day; another turns on the lighting effects at dusk. The switches also shut down the fountain at midnight.

Pumproom below the fountain with motor-driven pump, thrustors, piping





Below the fountain is housed the control apparatus, with motor-driven controller and magnetic switches shown here

Over-all cost of the fountain was $22,000, of which $8,000 was spent for electrical equipment and wiring. Ralph Flewelling, Beverly Hills architect, designed the fountain; the frieze around the base, depicting the history of California, was executed by Merrell Gage. All water and lighting effects were worked out by General Electric Co. illuminating engineers.

As Beverly Hills Mayor Paul Schwab remarked, "Probably no single attraction that the city has to offer in the way of beauty has received more attention or praise than the fountain."

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What a Field Man Can Do

IF Red Seal organizations are debating the usefulness of a field representative, they have only to ask the Electrical League of Colorado about John A. Baker, its field man, who has been highly successful in promoting additional outlets in buildings. In September he set a record for himself of 805 outlets added; no better report has been submitted since the year 1926.

The 805 outlets would not have been installed but for the recommendations made by Mr. Baker at the time the wiring was being planned. To create this work, he made a total of 181 calls to 4 residences, a church, a garage, a store, a school, and four apartment houses with a total of 132 individual suites. The increase in connected wiring is 96 kw. The two range outlets are of 10-kw. capacity each. Five of the special-purpose outlets are of 1-kw. capacity, and the remaining 16 are for ventilating fans.

In addition to this work, five new Red Seal applications were signed up and 38 certificates awarded.

Type of Outlet	Actually Added	Pending Completion	Total Added
Convenience	372	36	408
Switch	141	29	170
Ceiling	247	37	284
Reflector	22	147	169
Telephone	—	1	1
Range	2	2	4
Special	21	3	24
Total	805	255	1,060

New Code Changes Require Foresight

Contractor or Engineer Must Prepare Wiring Plans According to Expected Operation of Plant Equipment Under 1931 Code Rules

By LOUIS F. LEUREY,
Electrical Engineer, San Francisco

CHANGES in the new 1931 National Electrical Code—just published and now in effect—over the 1930 Code constitute one of the most complete and important revisions ever made in electrical rules and bring the present code nearer abreast of present practice than it has ever been.

There have been several hundred changes from the 1930 Code, some of them exceptionally important from an economic standpoint, some of them of relatively minor importance, but all of them tending to clarify obscure language in the previous code and to bring the code rulings in line with generally accepted practice.

Further on in this article a number of new rules are cited with comments thereon. These particular rules have been selected because of their importance from the point of view of the cost of doing electrical work in industrial plants, but they constitute only a few of the total number of changes in the 1931 Code. Some of them are peculiarly important, notably the rules which deal with temperature, moisture and corrosive conditions within buildings.

These rules are naturally subject to numerous interpretations but the intent seems clear that the responsibility now devolves on the owner and his engineers to determine in advance, as far as is reasonably possible, the expected conditions in new buildings as to temperature, moisture and corrosion. This constitutes a peculiarly difficult problem, because of the fact that occupancy and character of operation may change after the building is once constructed, and in these cases no amount of foresight will prevent the possibility of having to do additional electrical work at some future date. It is, however, very plain that to protect the owners' economic interest, engineers must undertake a very careful scrutiny into the expected operation of the building to be constructed, so as to avoid unnecessary increase in the capital cost of electrical work and at the same time avoid, as far as possible, the necessity of reinstallation of electrical circuits after the building has been constructed.

The information on the changes noted has been obtained from an analysis of the 1931 Code by Arthur L. Abbott. It is a most complete and valuable commentary on the new code, and it is recommended that every one interested in the design or installation of electrical circuits secure one or more copies of this anlysis. The analysis is officially known as "Publication 31-11" and can be obtained at the price of 10 c. per copy from the National Electrical Manufacturers Assn., 420 Lexington Ave., New York.

COMMENTS ON SOME OF THE CHANGES IN THE 1931 NATIONAL ELECTRICAL CODE

Changed Definition—"Motor Circuit Switch": a switch intended for motor branch circuits, capable of interrupting the maximum operating overload current of a motor of the same horsepower rating at the rated voltage.

This changed definition resulted from the requirement in the 1930 Code that switches in motor circuits of 50 hp. and under be "Horsepower Rated" and capable of interrupting the locked rotor current of the motor. (See Rule 1003-c, 1931 Code.) This rule was made necessary by numerous failures of "General Use Switches" to open motor circuits, with resulting serious damage to life and property.

New Definition—"General Use Switch": A switch intended for use as a switch in general distribution and in branch circuits. It is rated in amperes and is capable of interrupting its rated current at its rated voltage.

This type of switch is no longer permissible for disconnecting motors having a connected load of 50 hp. or under or for larger loads where the controller does not open all ungrounded main conductors to a motor, except as otherwise permitted. A "General Use Switch" may be used as the disconnecting means for a 3-hp. or smaller motor, where the voltage is 300 volts or less.

Rule 403-c—By approval from the local inspection bureau it is now possible to use for service conductors a recently developed type of armored cable having a special weatherproof braid over the armor.

It is necessary to secure definite permission to use this cable from the authority administering the Code.

Rule 500-1—Slow burning insulation (Type S.B.) wire or asbestos covered wire (Type A) shall be used in permanently dry locations where the surrounding air temperature will exceed 120 deg. F.

The 1930 Code allowed Type S.B. or Type A wire to be used in "excessively hot" locations by special permission. The new rule makes the use of these wires mandatory where the ambient temperature exceeds 120 deg. F. Engineers and contractors should inform themselves in advance of the temperature conditions to be reasonably expected in buildings that are to be wired. It is manifestly not the intent of the code to require "slow burning" or asbestos covered wire in places where 120 deg. F. is reached only occasionally. The intent would seem to cover those cases where a sustained temperature of 120 deg. F. or higher is realized, because ordinarily rubber insulation would not be seriously deteriorated by occasional temperature rise.

Rule 503-n—Wires of different systems shall not occupy the same conduit, "outlet box, junction box, fitting or cabinet." A barrier of insulating material may be used to divide a cabinet or cutout box in order to separate the wires of different systems.

This new rule specifically includes outlet boxes, junction boxes, cabinets and fittings. The rule was always applied to conduit.

Rule 503-p—Conduit wiring installed underground or in concrete slabs or other masonry in direct contact with moist earth, or in other permanently moist locations where subject to the condensation of moisture, shall be of the lead-covered type specially approved for this purpose.

This is a new rule of great importance and places on the owner the responsibility of using lead cable under conditions of known moisture. Engineers and contractors should inform themselves of the exact conditions as to moisture in any building wherein they propose to install conduit wiring. The intent of this rule is manifestly to cover conditions of inherent moisture and is not intended to cover those cases where moisture may temporarily exist due to the overflow of tanks or other purely accidental circumstance.

Rule 503-q—This rule covers the number and size of conductors permissible in one conduit. It includes for the first time in Table 4 the number and size of lead-covered conductors that can be installed in one conduit.

Rules 505-c and d—Defines the use of Armored Cable and inserts a new prohibition against Type A.C. armored cables where they may be "exposed to oil, gasoline, or other materials having a deteriorating effect on rubber insulation."

Rule 508-e—The range of approved "Electrical Metallic Tubing" is extended to 1¼, 1½ and 2-in. sizes.

Rule 511—An entirely new rule. It defines complete rules for "wireways" and "busways," two types of wiring that heretofore have not been covered in the National Electrical Code.

Rule 512—An entirely new rule. It covers the construction of "Auxiliary Gutters" used to supplement wiring spaces at meter centers, distribution centers, switchboards, etc.

Rule 808, A-1 to A-5—An entirely new rule. Its purpose is to provide a method of determining the minimum allowable size of power feeder, or a feeder supplying a combined light and power load.

It is recommended that where local authority exists for administering the code that it be consulted in each case in the application of this very important rule.

Rule 808-e 1, 2 and 3—Extends permission to eliminate the use of fuses on "Motor Remote Control Circuit Conductors" under certain conditions.

With the rapid extension of remote electrical control of motors and equipment it is very desirable to minimize the use of fuses on control circuits. This is largely an engineering problem and should always be undertaken with the aid of competent technical advice.

Rule 907-1—Requires ground wires of all types, where run in conduit, to be bonded to the conduit at each end.

Rule 1102-a—Oil-filled transformers, 7½-kva. and under, may be installed within a building without constructing a fireproof enclosure, if located away from combustible materials. Oil-filled transformers outside of buildings may be installed against blank masonry walls if kept away from doors, windows or fixed openings.

In both cases permission of the local inspection department must be secured.

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Floodlight Lincoln Memorial

THREE X-ray No. 37-C floodlights, using 500-watt lamps and control rings, bring out by night the beauty of the bronze statue of Abraham Lincoln erected in Spokane, Wash., by the Lincoln Memorial Assn. The memorial is the work of Alonzo Victor Lewis and its cost was defrayed by public subscription.

The floodlights are mounted 18 in. above ground on 2-in. pipes set in concrete, each fixture and support being partially concealed by shrubbery. They are fed by a circuit of lead-covered cable in conduits running to a traffic signal manhole where a G.E. telechron time clock controls the hours of burning—dusk to midnight daily. The floodlighting installation cost approximately $250 and was installed by Maxwell & Franks, electrical contractors of Spokane.

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Red Seal Wiring Standards Tabulated for Simplicity

EARL BROWNE, former manager, San Francisco Electrical Contractor-Dealers' Assn., has assembled the Red Seal wiring standards of the Pacific Coast Electrical Bureau into tabular form. Mr. Browne's work means a saving of considerable time to contractors for information now may be gained at a glance instead of hunting through many pages of rules as was necessary before.

Pacific Coast Electrical Bureau Red Seal Wiring Standards for Commercial Bldgs. Only. (Not Industrial, Residence, Church or Theatre)

	Wattage per square foot	Convenience and special outlets	Demand as per 1928 Code
All commercial buildings (except those below)	3		
Auditoriums	2		
Basements	1		
Banking rooms — general illumination	3		
Banking rooms — cage illumination in addition to above	4		
Baths	1		
Corridors (except hotels and schools)	1		
Dance halls	2		
Drafting rooms	5		
Elevator cages	1,000 pair		
Exits	50 each		
Fire escapes	50 each		
Garages — main entry floor	2		
Garages — aisles and ramps	½		
Garages — storage space	½		
Garages — wash racks	1,500 each		
Halls (except hotels and schools)	1		
Hospitals — wards and private rooms	1		100%—25M
Hospitals — operating rooms	10		60%+25M
Hospitals — laboratories	5		
Hotels — dining rooms	2		100%—10M
Hotels — bedrooms (2) convenience outlets	1½	2	80%—50M
Hotels — bedrooms (3) convenience outlets	1	3	70%+50M
Hotels — halls, passage and corridors	½		
Lavatories	1		
Office buildings	3	1 per 100 sq. ft. 1 per 400 sq. ft.	100%—10M 70%+10M
Passageways (except hotels and schools)	1		
Schools — drawing and art rooms	5		
Schools — corridors and stairs	2		100%—10M
Schools — toilets and wash rooms	1		50%+10M
Stations — waiting rooms	2		
Stations — rest rooms	2		
Stations — storage	2		
Stairways (except schools)	100 each		
Stores — interior	3	1 per column 1 per 400 sq. ft.	
Stores — show windows	150 foot	1 per 50 sq. ft.	
Stores — signs	1,500 each	1 per 10 ft. glass	
Stores — spots and floods	300 each	2 per 10 ft. glass 1 each 10 ft. glass (additional)	
Stores — show cases	2,000–50 ft.	1 per column	

(a) 1¼ times ceiling height (except halls, corridors and garage storage space)
(b) Spacing of ceiling outlets: 225 sq. ft. of floor space (except 18 ft. ceilings).
(c) 25 ft. bay when ceiling height is 18 ft. or more
(d) not to exceed 20 ft. in halls and corridors.
(e) As desired in garage storage spaces.
(f) Convenience outlets not to exceed 8 per circuit (except for show cases).
(g) 3 per circuit (installed for show cases).
(h) Watts per circuit, 1000 (except signs and wash racks).
(i) Wire No. 12 minimum 100 ft. or less—No. 10 all over 100 ft. except stairs, fire escapes and exits.
(j) Voltage drop—not to exceed 2% in services, feeders and circuits over 1000 watts.

Economies of Loop and Radial Feeder Circuits Combined in Spokane Underground System

Cost Comparisons on a Percentage Basis of Loop and Radial Feeders in Various Combinations, Which Are Tabulated in This Article, Permitted the Changeover from A.C. to D.C. to be Made With a Minimum of Expense and Service Interruptions

By F. L. ROHRBACH
Underground Engineer
The Washington Water Power Co.

CONFORMING with the standard practice of the early days in the electrical industry, the business district of Spokane originally was served with direct current from an Edison 3-wire system. Several years ago a rapid increase in the peak load indicated that the generating capacity of the d.c. machines would soon be reached and investigation was undertaken by The Washington Water Power Co. to determine the manner in which demands for additional energy were to be met.

From a general study of the d.c. underground system covering districts 1, 2, 3 and 4, it was decided gradually to surround the main d.c. load with an a.c. underground network system. As shown on facing page, the district under consideration was tentatively divided into four sections. Starting with district No. 1, the shaded area representing the main d.c. load was to be surrounded by the a.c. underground system only as conditions warranted and the changeover from underground direct current could be accomplished. Overhead d.c. outside of the district was cut over to an overhead a.c. system.

As the original load to be served by the new installation included several new buildings situated too far apart to interconnect the secondaries, the logical choice of service was a 4-kv. loop feeder with balanced relay protection, which was cut into service in 1927 and supplied three widely separated vaults. In the following two years two additional 4-kv. loop feeders were installed, respectively serving twelve and fifteen vaults in districts 2 and 3, but district No. 2 only was changed to alternating current.

In 1930 the abandoning of d.c. substation "B" made necessary the installation of several more a.c. feeders to permit the changeover of districts 3 and 4 to that type of service. Growth of the underground system had reached the point where all secondaries in the area were tied together, and the economy of radial feeders could be taken advantage of without impairing the service to the customer. Consequently the additional feeder capacity was supplied in two 13.2-kv. radial feeders.

At the present time three 4,000-volt loop feeders and two 13.2-kv. radial feeders supply 47 vaults with interconnected secondaries comprising the underground system in this city. All feeders emanate from substation "A." On page 289 general details of the installation are shown. Substation "A" is served from two generating stations and a number of 13-kv. feeders. The 13-kv. bus and both 4-kv. buses are of the double type, selective operation from either the main or auxiliary bus being provided through oil circuit breakers and disconnecting switches.

FOUR-THOUSAND-VOLT RING FEEDER INSTALLATION

Loop feeders are three-conductor, 250,000-circ.mil, 4,000-volt, paper-insulated, lead-covered cable, each of which is paralleled for its whole length by a three-conductor No. 8 control cable. At the substation end there are three oil switches, the main breaker being solenoid operated while the other two station breakers, one on each of the two sides of the feeder, operate on a balanced relay protection system as a unit with the first mentioned breaker. Breakers in each vault operate to isolate faulty sections of cable between any two vaults. Single-phase reactors and voltage regulators are installed in each loop feeder circuit.

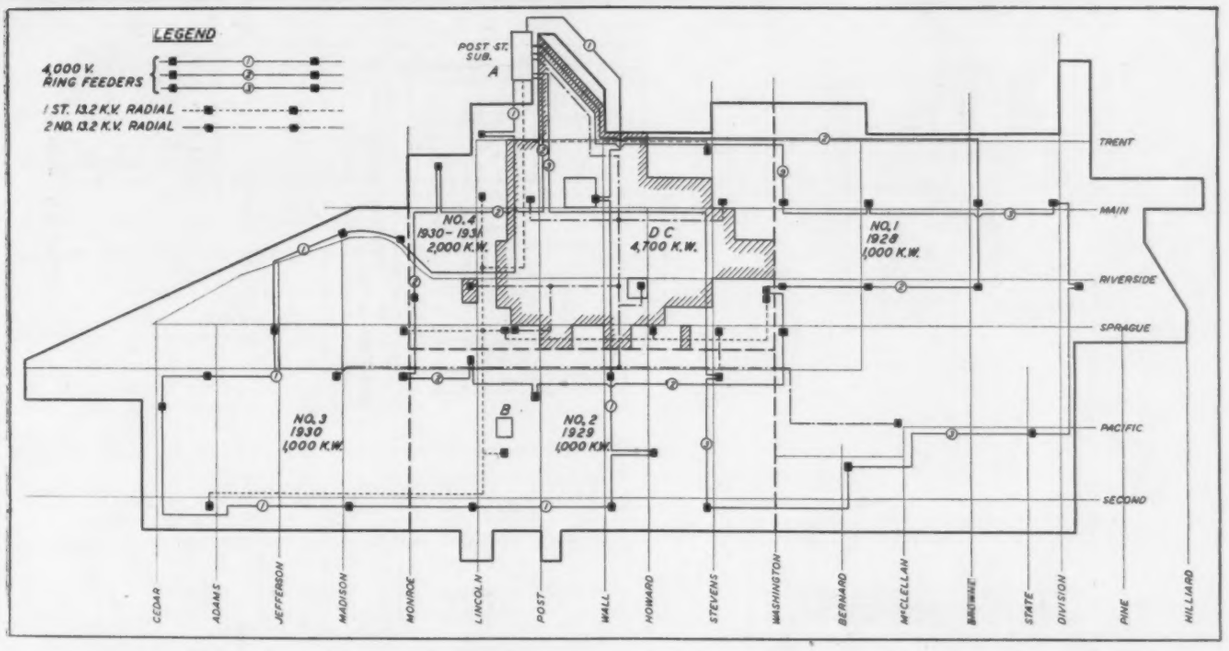
Details of the vault construction are shown in the accompanying illustration. Vaults are usually located in the streets, it having been found impracticable to place them in areaways, except in the case of new building. Natural ventilation is provided by grates in the roof at each end, the inlet being carried to the floor. Effective grate area at each end of the vault is 900 sq. in. One manhole opening is used, the cover of which is made in two concentric pieces so that it is necessary to remove only the smaller part except when larger apparatus is being installed. Two lighting outlets are provided in each vault, the wiring being in conduit and connected to the outgoing side of the secondary fuse box or protector.

The feeder cable terminates in a subway oil switch rated at 15 kv., 400 amp., with an interrupting capacity of not less than 8,000 amp. at 4,000 volts. Signal wires from each vault oil switch are carried to an indicator installed at the substation.

Two types of primary boxes are used, one a three-phase, four-way, and the other a single-phase, four-way box. In either type two of the four ways are used for the feeder, one for the transformer and the fourth as a spare.

Transformers are of the standard subway type, single-phase, 2.4 kv. to 120 volts with 4.3 per cent impedance. They are connected Y on both the primary and secondary, the Y points of the primary and secondary windings being connected together inside the case, this common point being connected to the neutral of the secondary network. A 1,200 to 1 ratio current transformer is installed in one of the secondary leads of each transformer.

Secondary leads, consisting of 1,750,000-circ.mil Kerite cable, are run from the transformers to a fuse box, where



Layout of the Spokane underground system showing the location of vaults and the arrangement of loop and radial feeders added at intervals to gradually surround the d.c. area

they can be fused to a maximum of 2,000 amp. From the fuse box the cables are connected to single-phase, five-way boxes in the nearest manhole. Copper strips are used for connecting or disconnecting the secondary mains, but fuses can be installed instead of copper strips.

Secondary mains are 500,000-circ.mil, single conductor, lead-covered cables installed in separate ducts. Where the alternating current superseded the underground Edison three-wire system, the old d.c. mains were not disturbed, a fourth conductor being pulled in to give the third phase, the neutral of the old d.c. system now being used as the neutral of the a.c. system.

13,200-Volt Radial Feeder Installation

For these feeders three sizes of 15,000-volt, three-conductor, paper-insulated, lead-covered cable were used. From the substation to the first branching of the feeder 350,000-circ.mil conductor is used. From that point to another main branch, No. 3/0 is used, No. 1 making up the rest of the feeder. From the 13-kv. bus, the radial feeder is brought through a reactor and oil circuit breaker, passing directly from that point into the underground ducts.

Vaults for the 13,200-volt radial feeders are similar to the loop feeder vaults but are built 3 ft. less in width and 1 ft. deeper. No primary boxes are installed in the vaults, the three-phase feeder being connected to single-conductor cables which in turn are connected to the transformers through potheads in an oil-filled chamber. Two of the eight vaults on each feeder have disconnecting and grounding switches connected in the primary leads to the transformer.

Transformers are of the standard subway type, single-phase, 13.2 kv. to 120 volts with 6 per cent impedance. They are connected delta on the primary and Y on the secondary.

Transformer secondaries pass into 1,600-amp. triple-pole, trip-free, motor-operated, submersible network protectors having non-sensitive tripping attachments to permit setting at 50-, 100-, or 150-amp. reverse current. Materials and connections from the protector to the secondary mains are the same as heretofore described for the ring feeder installation.

The following tabulation gives a summary of the network installation now installed in Spokane:

Type of Feeder	Feeders	Vaults	Installed Trans.	Capacity Feeder		Peak Load 1930	Peak Load 1931 (Est.)
4,000-volt Ring	3	31	9,750	6,000	a.c.	5,400	6,300
13,200-volt Radial	2	16	6,450	14,000	d.c.	4,700	4,500
Total	5	47	16,200	20,000		10,100	10,800

Based on the installation of the foregoing system, unit costs of its various component parts have been broken down on a percentage basis into the following comparison.

TABLE I

A comparison of costs (not including mains, services, manholes, or duct lines) of four schemes, each consisting of 56 vaults, having three 100-kva. transformers per vault

Type of Feeder	Feeders	Vaults	Kva. Capacity Installed Trans.	Kva. Capacity Installed Feeder	Load	% Cost
4,000-volt Ring	7	56	16,800	14,000	14,000	100.00
4,000-volt Radial	8	56	16,800	16,000	14,000	92.84
13,200-volt Ring	2	56	16,800	14,000	14,000	103.39
13,200-volt Radial	3	56	16,800	21,000	14,000	99.45

TABLE II

Cost at substation end up to feeder pothead

		% Cost	Regulators
4,000-volt Ring feeders	7 feeders	100.0	Each feeder with regulators
4,000-volt Radial feeders	8 feeders	93.1	
13,200-volt Ring feeders	2 feeders	91.9	Regulators in bus
13,200-volt Radial feeders	3 feeders	88.85	

In this tabulation the cost considered was that necessary to build cells, extend buses, and install feeder equipment. Necessary floor space was not considered as it was already available, but in a complete layout of a new system this item might amount to a considerable sum as each ring feeder requires three oil switches instead of one used on a radial feeder. Both 4-kv. and 13.2-kv. buses were available

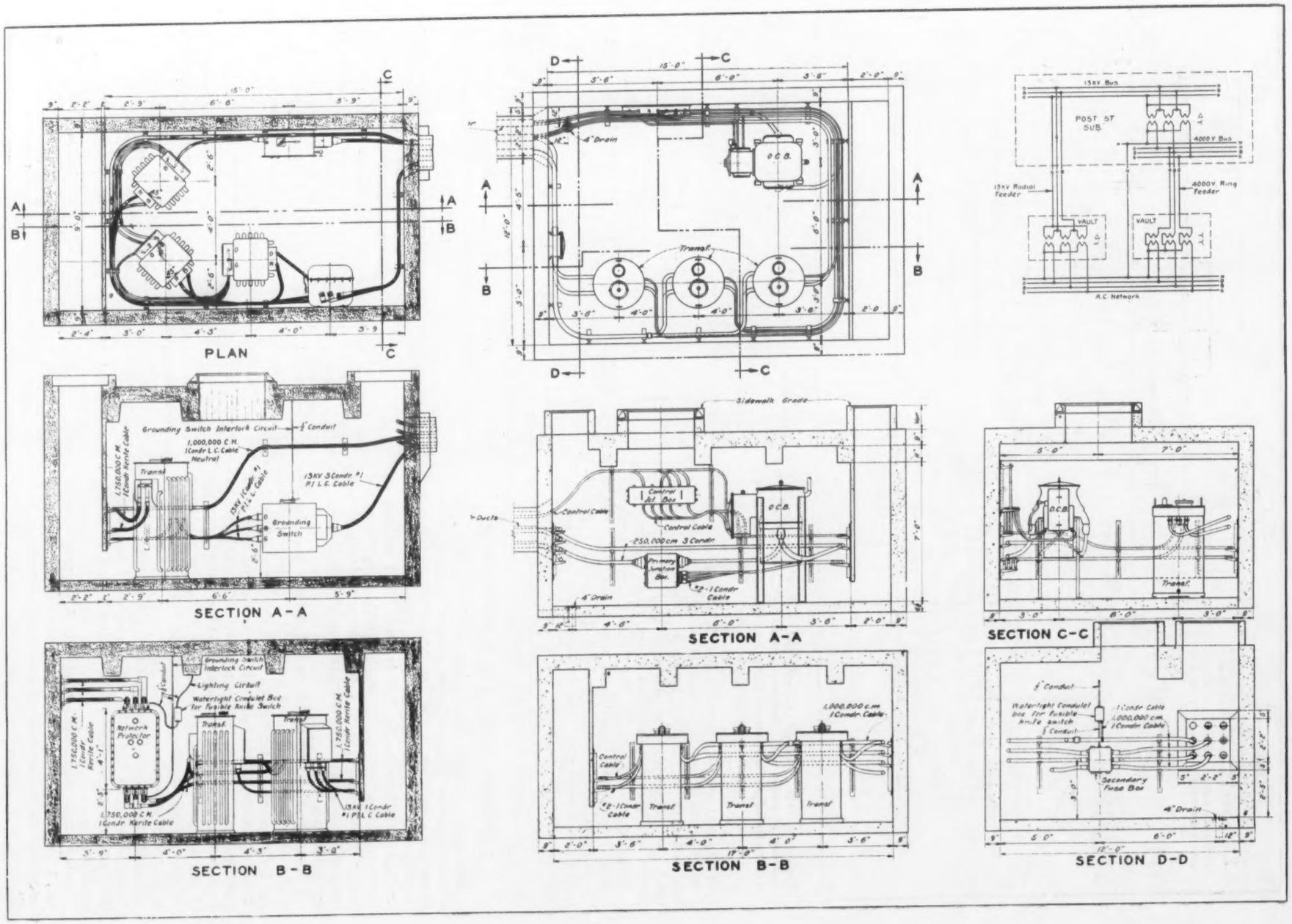

PLAN
SECTION A-A
SECTION B-B
SECTION A-A
SECTION B-B
SECTION C-C
SECTION D-D
POST ST SUB.
13kV Bus
4000 V Bus
13kV Radial Feeder
4000V. Ring Feeder
VAULT
VAULT
A.C. Network
Grounding Switch Interlock Circuit
1,000,000 C.M. 1 Condr L.C. Cable Neutral
1,750,000 C.M. 1 Condr Nerite Cable
13KV 3 Condr #1 P.I. L.C. Cable
Grounding Switch
Transf.
Sidewalk Grade
Control Cable
Control Jct Box
O.C.B.
250,000 cm 3 Condr
Primary Junction Box
#2-1 Condr Cable
4" Drain
Ducts
Lightning Circuit
Watertight Conduit Box for Fusible Knife Switch
Network Protector
Trans.
1,750,000 C.M. 1 Condr Nerite Cable
13kV. 1 Condr #1 P.I.L.C. Cable
1,000,000 c.m. 1 Condr. Cable
#2-1 Condr Cable
Secondary Fuse Box

TABLE III

Cost of feeders from feeder pothead to vault. As the table shows, it is the necessary control and signal cable which increases the cost of a loop feeder over the radial type

		Per Cent Cost			
		Control	Signal	Feeder	Total
4,000-volt Ring feeders	7 feeders	18.5	9.4	7.21	100.0
4,000-volt Radial feeders	8 feeders	0	0	62.0	62.0
13,200-volt Ring feeders	2 feeders	9.7	9.4	54.5	73.6
13,200-volt Radial feeders	3 feeders	0	0	54.5	54.5

TABLE IV

Cost of vaults and duct connection to manholes

		%
4,000-volt Ring	56 vaults	100.0
4,000-volt Radial	56 vaults	95.1
13,200-volt Ring	56 vaults	105.7
13,200-volt Radial	56 vaults	100.9

Radial feeder vaults are 3 ft. less in width than the loop feeder vault. The 13.2-kv. vaults are 1 ft. deeper than 4,000-volt vaults. Each vault is built for a maximum of three 200-kva. transformers

TABLE V

Cost of equipment in vaults including three 100-kva. transformers and accessories

		Per Cent Cost		
		Transformers	Other equipt.	Total
4,000-volt Ring	56 vaults	58.36	41.64	100
4,000-volt Radial	56 vaults	58.36	51.04	109.4
13,200-volt Ring	56 vaults	76.54	45.26	121.8
13,200-volt Radial	56 vaults	76.54	51.06	127.6

TABLE VI

Duct feet required for feeders

		Per Cent		
		Control	Feeder	Total
4,000-volt Ring	7 feeders	50.00	50.00	100.00
4,000-volt Radial	8 feeders	0.	54.33	54.33
13,200-volt Ring	2 feeders	26.25	26.25	52.50
13,200-volt Radial	3 feeders	0.	38.58	38.58

In Table 1 (total costs) no item was included to allow for the considerable difference in duct feet required for ring and radial feeders. In a new system this item would have to be considered as there would be a large saving in favor of radial feeders as shown below

TABLE VII

Comparison of transformer banks (vaults) cut out of service by faults in feeders

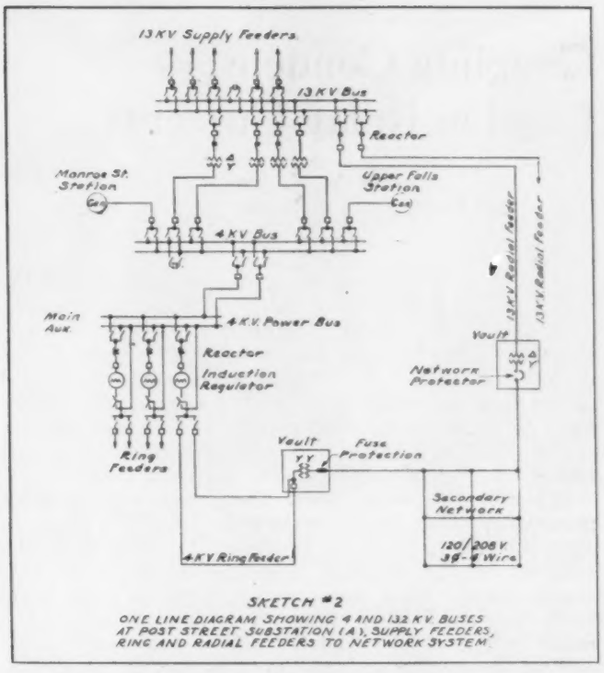
	Total Vaults	Feeders	Cable at Fault	Vaults Out	% Out	2 Cables at fault same point	Vaults Out	% Out
4,000-volt Ring	56	7	1	1	1.8	2	2	3.6
4,000-volt Radial	56	8	1	7	12.5	2	14	25.0
13,200-volt Ring	56	2	1	1	1.8	2	2	3.6
13,200-volt Radial	56	3	1	19	34.0	2	37	66.1

TABLE VIII

City blocks (average 375 ft.) and manholes containing two or more primary feeders

4,000-volt Ring	7 feeders	35 blocks	58 manholes
4,000-volt Radial	8 feeders	55 blocks	59 manholes
13,200-volt Ring	2 feeders	4 blocks	5 manholes
13,200-volt Radial	3 feeders	34 blocks	35 manholes

Facing page—Drawings of (left) 13.2-kv. vault and (right) 4-kv. vault typical of the installation. The schematic diagram shows methods of interconnecting the secondaries of the two feeder circuits



One-line diagram of connections for 13.2-kv. and 4-kv. feeders

From Tables VII and VIII it is evident that the loop feeder system will greatly improve operating conditions in case of trouble on the primary cables, especially where the system requires less than four or five feeders. As a rule, the transformer capacity on radial feeders would be sufficient, but the number of low-voltage areas would mean poor service.

Consideration of such items as space requirements in the substation, cost of feeder cable, and actual duct line required, with the figures given in Table I shows that the radial system is considerably cheaper. The disadvantage lies in the difficulty of giving proper service with few radial feeders, investment in duplicate feeders and transformers being necessary in the original layout.

In changing an area to underground service, the experience of this company has proved that satisfactory service can be expected if loop feeders are used for the original installation and later supplemented with radial feeders. Economies of the latter type then can be realized without impairing service in case of cable failure.

To make the changeover with minimum inconvenience to the customer, a survey of the district to be cut over was made and included a record of each customer's equipment. Schedules were prepared three or four months in advance giving the date for changing each block.

The customer having equipment to be replaced was advised of the date of change-over, and what would be necessary so that there would be no delay and as little inconvenience as possible. Agreements were signed by each customer where equipment was to be changed. Local contractors made necessary wiring changes and had their work completed in advance of the date of cut-over.

Where it was necessary to install a new service or a fourth conductor (4-wire, 3-phase) our company did so in advance. In most cases the interruption to service was less than 30 minutes.

The operation of this system so far has been exceptionally satisfactory. Save for a few minor troubles due to faulty connections in the control system of the ring feeders, and one case of slight relay trouble in a protector, excellent service has been given. To date, the system has been free from any cable failure.

Coupling Condensers Provide Relay Currents

By A. V. JOSLIN
Assistant Engineer, Pacific Gas and Electric Co., San Francisco, Calif.

FOR many years the backbone of the relay system for protecting the high voltage lines of the Pacific Gas and Electric Co. has been the directional residual relay. The directional current for this relay is usually obtained either from the grounded neutral of a main transformer bank or from the delta of a small three-phase bank of special 110/5-volt transformers connected star-delta and energized from the 110-kv. bus potential circuit.

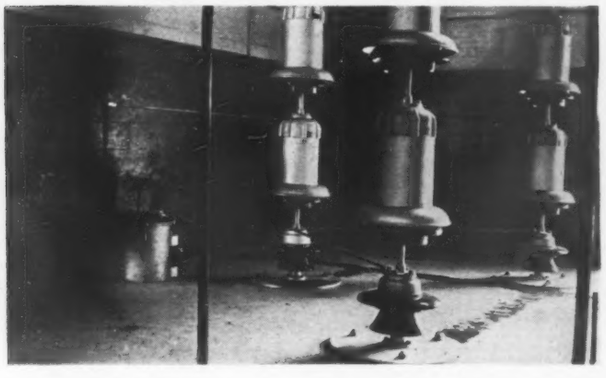
Directional currents from these two sources differ materially. That from a main bank neutral is ample in quantity and it tends to be closely in phase with the residual current obtained from the three line current transformers. That from the small special bank tends to be very small when there are large star-delta power banks in the vicinity and it tends to lead the residual current by varying amounts up to 40 deg. or more.

As the disk movement of the single element directional residual relay is produced by the combined effect of the residual and the directional currents, it is very difficult to obtain the proper sequence of operation among relays whose directional currents are obtained from sources so widely different.

Even with relays which obtain directional currents from main transformer banks, proper timing is difficult if any station has more than one main bank. When only one bank is in service at such a station, the directional current of the relay is much less than it would be with two or more banks in service, while the directional current of relays at adjacent stations is not materially affected. This, of course, upsets the timing sequence of the relays as between this station and those near by.

To overcome this difficulty, the Pacific Gas and Electric Co. has replaced many of its single element directional residual relays with two-element directional residual relays. One element determines the timing, and is operated by the residual current only. The other element gives the directional feature and is operated by both the residual and the directional current. Directional current may therefore be obtained from any proper source as long as its minimum value is sufficient to close the directional contacts within a few cycles.

Lower section of three-phase 110-kv. coupling condensers. The single potential transformer connected between neutral point and ground to give directional current is shown at the left



It was desired to install such directional residual relays in one of the 100-kv. Oakland substations of the Pacific Gas and Electric Co. in which there was no available source for the directional current. The main transformer banks are connected delta-delta and there are no 110-kv. potential transformers. Moreover there is no satisfactory 110-kv. potential transformer location conveniently available.

Therefore, it was decided to use high-voltage coupling condensers for the primary source of the directional current, inasmuch as a satisfactory location was available. Normal practice would indicate the use of one stack of condensers per phase, each with its attendant transformer with the proper secondary delta connections for obtaining the directional current for the relays.

Directional current was required for residual relays only, owing to the directional overcurrent phase relays obtaining their directional current from potential transformers on the low tension buses. Therefore the standard installation of three transformers connected to the three condenser stacks seemed unduly complicated for the simple duty required.

The Ohio Brass Co. engineers suggested that if the neutral terminals of the condenser stacks were connected between this point and the ground, the directional current for the residual relays could be obtained from the secondary of this transformer.

This appeared to be a satisfactory solution of the problems and this type of installation was made, as shown in the accompanying illustration. The directional current from the single transformer leads the line-to-ground voltage by a phase angle of approximately 90 deg. The fault current to ground usually lags the voltage by an angle of approximately 60 to 80 deg. Therefore, reversing the directional current gives a phase difference of 10 to 30 deg. between the two currents supplying the relay. The relays have characteristics such that this small phase difference between the currents gives practically maximum and directional torque for the duration of a ground fault.

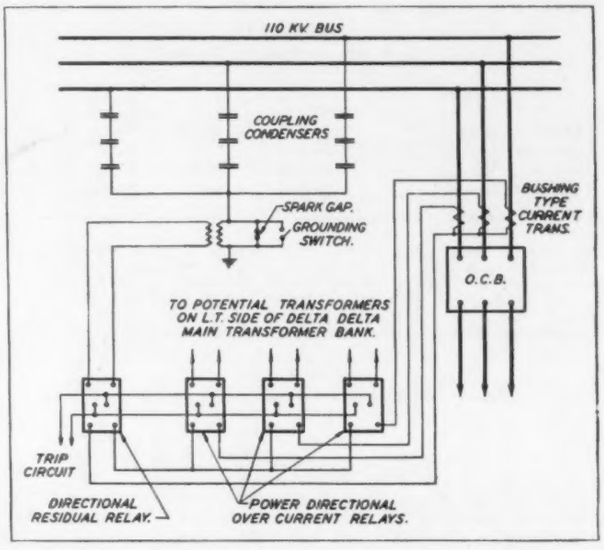


Diagram of connection for coupling condenser installation. This layout has advantages of simplicity and relatively low cost in providing directional currents for relay operation when convential source of potential is lacking

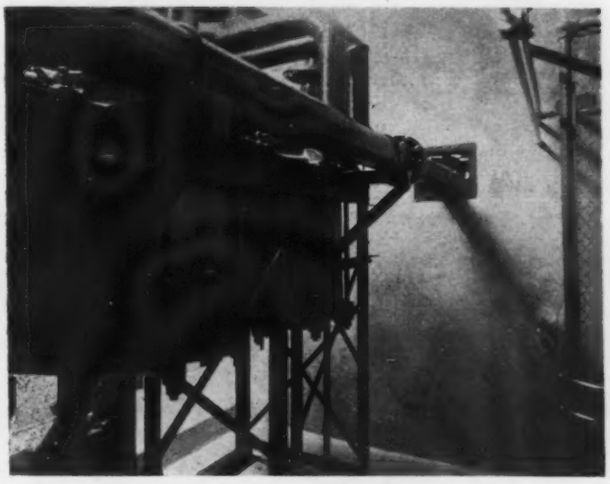
Complete tests, simulating fault conditions and normal operating conditions, were made immediately after the installation was completed and everything functioned exactly as anticipated. On account of its simplicity and low cost this seems to be an excellent method of obtaining directional current where only two-element residual relays are to be served.

▼

Venting Reduces Hazard Of Indoor Breakers

By G. C. McKee
Junior Mechanical Engineer,
Los Angeles Bureau of Power and Light

OIL circuit breakers in indoor switching stations are the source of gas and oil which have caused several serious explosions. When relaying under certain conditions, gas is formed and discharged through the vents, and the switches being partially enclosed, the gas thus vented is fuel for violent secondary explosions. After several such explosions the engineers of the Bureau of

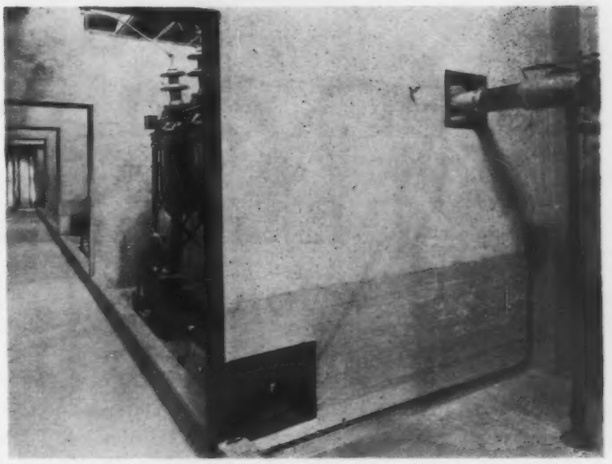


Vent manifold installation showing welded pipe outlets from each tank vent on the breaker

Power and Light worked out a system of vents for their 33,000-volt oil circuit breakers to carry the vented gases and oils to the outside of the building. The new arrangement eliminates the former hazard of secondary explosions and oil fires coming from oils discharged through the vents into the switch compartment.

There is a pipe manifold paralleling each switch into which each vent outlet is connected by welded pipe. The manifolds are connected by means of flexible steel hose. Switches are arranged in groups of five on each side of a center aisleway. The vent line is blanked at the aisleway end while the opposite end is open and extends to the outside of the building.

The oil circuit breakers in this indoor station are of the usual three-phase type, consisting of one tank per phase. Each tank is equipped with one or more vent outlets having blowout gaskets of the proper design to blow out when definite internal tank pressures are reached.



Flexible connection between sections of the vent manifold. Insulation is wrapped round the pipe where it passes through the wall to prevent possible interference with relay currents

In this particular case the switches in any one group were not alike. Tanks were not of the same strength and blowout gaskets varied with the design of the switch. To overcome this inequality the vent pipes were so designed that all pressures were reduced by increase of volumes until they were too low to do damage to other gaskets on the same line.

These switches are not anchored to the floor because of the frequent earthquakes that visit this locality. Thus when a switch relays, movement has been recorded both vertically and horizontally. Therefore the two aforenamed reasons show why systems connecting these switches should be flexible, The vent system is equipped with flexible metal hose of the continuous interlocking strip type, which gives maximum flexibility, and the electrical connections are taken care of by extra flexible copper cable from bus to terminal.

A fish paper insulation is wrapped around the hose where it passes through the metal frame in the wall. This added electrical insulation is to protect against interference with the ground currents on the sectionalized bus relay protection scheme.

Several serious secondary explosions and oil fires were experienced before the vents were connected to the outside of the building, and since the installation of the vent system one switch has relayed, ejected its gas and oil out of the vent and moved about in its compartment with no serious damage other than the loss of a small amount of oil.

▼

Edison Company Uses Miniature Transmission Lines

TO consolidate transportation problems, the Southern California Edison Co. is using to advantage several miniature "pole lines". In every respect excepting that of pole height these miniature lines are accurate models built to a reduced scale from existing lines.

To settle the question of adequate clearance and to determine the feasibility of different schemes for effecting the transportation desired, it is necessary only to use the steel model together with a few rubber bands. This can be done right in the office without requiring a field survey.

Different models have been made up for the different types of lines which the company is using. The cost of making up one of these models is practically nothing.

ROCK ISLAND—

A Major Low Head Hydro-Electric Development for the Northwest

Because of marked differences of runoff characteristics of streams on the east and west slopes of the Cascade Mountains, this new plant of the Puget Sound Power & Light Co. makes base load hydro power available during dry summer months. With a maximum head of 48 ft., an ultimate capacity of 150,000 kw. is possible at this point. Four of the ten 15,000-kw. units contemplated for the complete development comprise the initial installation

By C. C. DODGE
Stone & Webster Engineering Corp.

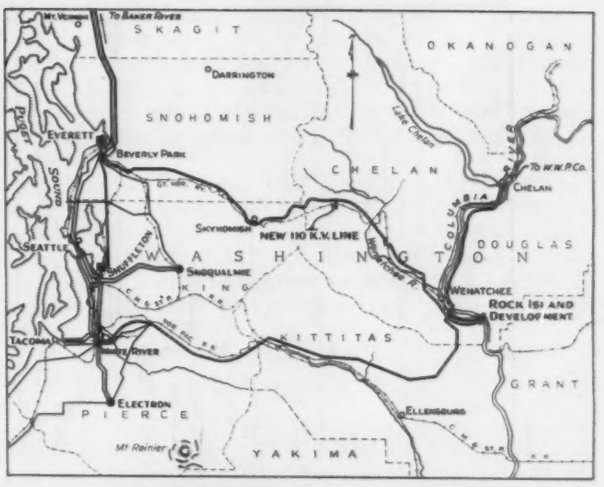
FOR many years engineers have recognized that the Northwest has a vast supply of potential energy in the flow of the Columbia River, but economic factors involved in the developing of this river have prevented the inception of any such development program until the present time. As the Columbia River is fed largely from glacial and mountain streams the maximum flood periods occur during June or July and the minimum flow occurs during the winter months. In its course across the plains of central Washington and through the Cascades to the sea, the Columbia is characterized by a relatively gradual fall and a consistently uniform flow between the months of October and April. During this period the flow seldom

exceeds 100,000 sec.ft. nor drops below 24,000 sec.ft. During the summer months, the flow averages approximately 350,000 sec.ft., the maximum on record being 740,000 sec.ft. These figures indicate the magnitude of any hydraulic development on this stream.

Aside from the financial investment required, the feasibility of power development on this river is dependent upon the market for the large amounts of power thus made available. Hydro-electric plants of the Puget Sound Power & Light Co. are located on the west side of the Cascade Mountains where limited storage capacity due to topographical characteristics seriously curtails the energy available from these plants during the fall and winter months of dry years. A large plant east of the Cascades would admirably supplement the existing generating stations because the Columbia River has a remarkably high sustained flow during the winter months, which would make the new station of considerable value as a base load plant even though negligible storage capacity were provided in the damming operations.

The site selected for the development is at Rock Island, 12 mi. below the city of Wenatchee, at which point the Columbia River divides into two channels having a 2,700-ft. width between the east and west banks. The proximity of a state highway and the Great Northern Railway limited the amount of head which could be developed to a maximum of 51 ft.

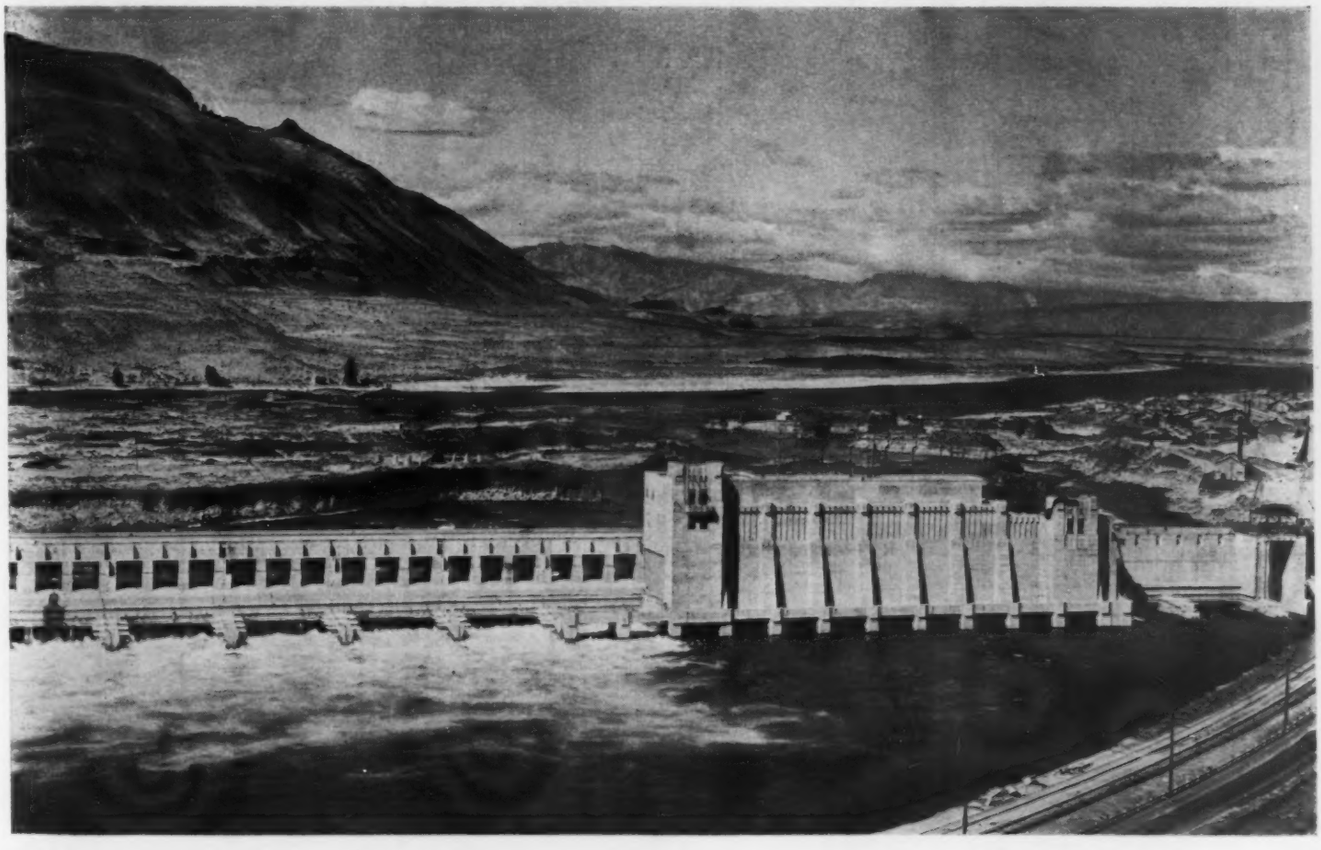
Careful consideration of climatic as well as hydrographic conditions was necessary in the construction of the dam. Summers are hot and dry and winters are dry but often extremely cold. Pouring and setting concrete in the winter months would ordinarily involve severe handicaps while, on the other hand, during the summer months, when conditions for construction work are more favorable, the river is at flood and the amount of construction work that can be done is limited.

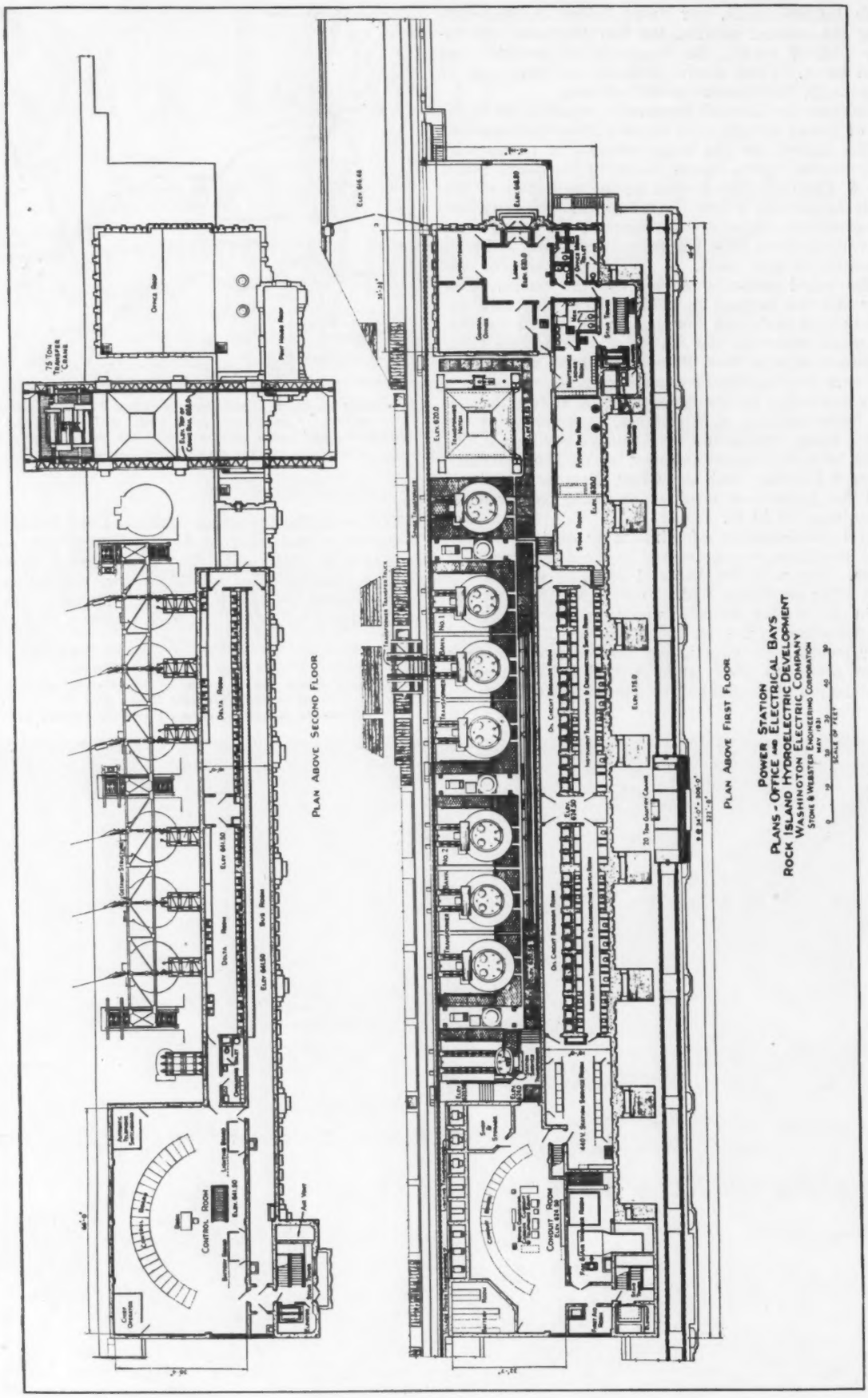


Location of Rock Island plant relative to the remainder of the system. Two transmission lines will deliver power to the north and south extremities of the more heavily loaded areas along Puget Sound

Even with the foregoing conditions and limitations of available normal head to 48 ft., 150,000 kw. could be developed at this point. The power house is designed for the installation of ten 15,000-kw. generating units, four of which are now installed, giving an initial generating capacity of 60,000 kw. with a normal head of 32 ft.

Rock Island hydro-electric plant of the Puget Sound Power & Light Co. located on the Columbia River, near Wenatchee, Wash. Ultimate maximum capacity will be 150,000 kw.




PLAN ABOVE SECOND FLOOR
PLAN ABOVE FIRST FLOOR
POWER STATION
PLANS - OFFICE AND ELECTRICAL BAYS
ROCK ISLAND HYDROELECTRIC DEVELOPMENT
WASHINGTON ELECTRIC COMPANY
STONE & WEBSTER ENGINEERING CORPORATION
MAY 1931
SCALE OF FEET

An island in the center of the river at the dam site permitted the construction of the dam in two steps, using the opposite channel in each case for diversion of the water during cofferdam operations. Work was started on the east channel cofferdams in February, 1930, and they were nearly completed before the summer floods came. In the late summer, after the floods had receded, the east channel cofferdams were completed and unwatered. Construction on the power house substructure and east dam was completed by February, 1931, to such extent that the east channel cofferdams could be removed and construction of the west channel cofferdams started. During the summer floods the power house superstructure was completed and equipment installation started. The west channel cofferdams were completed and work was started in the west channel dam in the fall of 1931. Consisting of the north abutment, the power house, the east and west spillways and the south abutment, the development extends for a total length of 3,500 ft. across both the channels and the island in midstream.

Power house and headworks are constructed with reinforced concrete and form an integral section of the dam. Because of the large variation in tailwater elevation the generator room has no outside windows and no openings except through the roof. This condition has required special consideration in connection with the lighting, ventilation and drainage systems. The Wenatchee Valley is hot and arid in the summer time and severe dust storms often occur. Because of this all air entering the building will be filtered and in the summer the air will be passed through air washers to cool it. In the winter the warm air from the generators will be used to heat the building.

The electrical bay, office and storage bay, power transformers and line getaway structure are located on the roof of the generator room well above high water.

Turbines are of the variable pitch, vertical shaft, propeller type and are designed to produce a maximum of power under a widely varying condition of head. Each main waterwheel is rated 21,000 hp. at 100 r.p.m. under a 32-ft. head; the station service wheel is rated 2,100 hp. at 300 r.p.m. under a 32-ft. head. Wheels were furnished by the Allis-Chalmers Manufacturing Co. To suit the head available, the pitch of the runner vanes may be changed by means of mechanism extending up through the center of the waterwheel shaft. The main wheels will develop about 10,000 hp. with a 20-ft. head and will efficiently develop rated output with heads from 32 ft. up to 48 ft.

Umbrella or overhung type generators with combined thrust and guide bearings mounted below the rotors are installed because this type of generator requires a minimum of headroom and is adapted to the low generator room which resulted from the building design used. A special lifting beam is used to facilitate handling of the rotors.

The four main generators are rated at 16,667 kva., 13,800 volts, 0.9 power factor, three-phase, 60 cycles, and the service generator at 1,750 kva., 460 volts, 0.7 power factor, three-phase, 60 cycles. All are of General Electric Co. manufacture, and are equipped with direct-connected main and pilot exciters with one motor-driven spare exciter set provided for emergency.

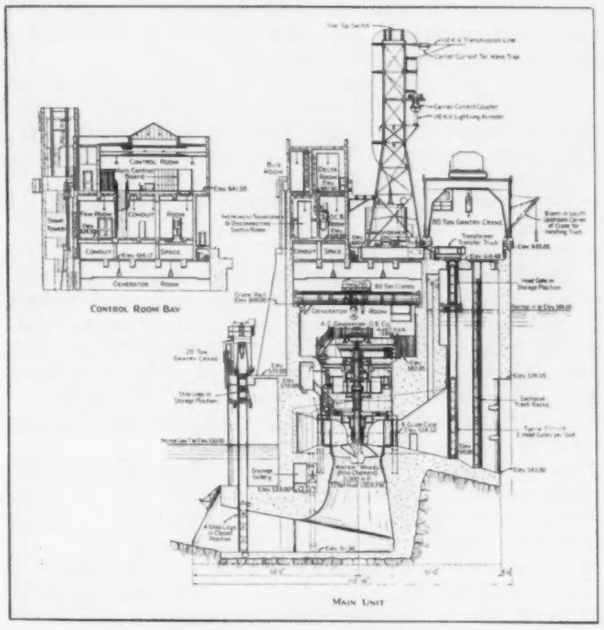
Erection methods for installing one of the 15,000-kw. generators. These generators are of the "umbrella" type with the thrust bearing below the rotor to accommodate low head room

Because the closed-in construction of the generator room made it impossible to bring in air ducts to the generators from outside the building without a great deal of expense, a closed recirculating air cooling system using surface air coolers is being provided for each main generator. Dampers are placed in the air housings so that the heated air may be readily recirculated throughout the building in the winter time. The stators have an over-all diameter of 28 ft. 9 in. and the rotors a diameter of 23 ft. 7 in.

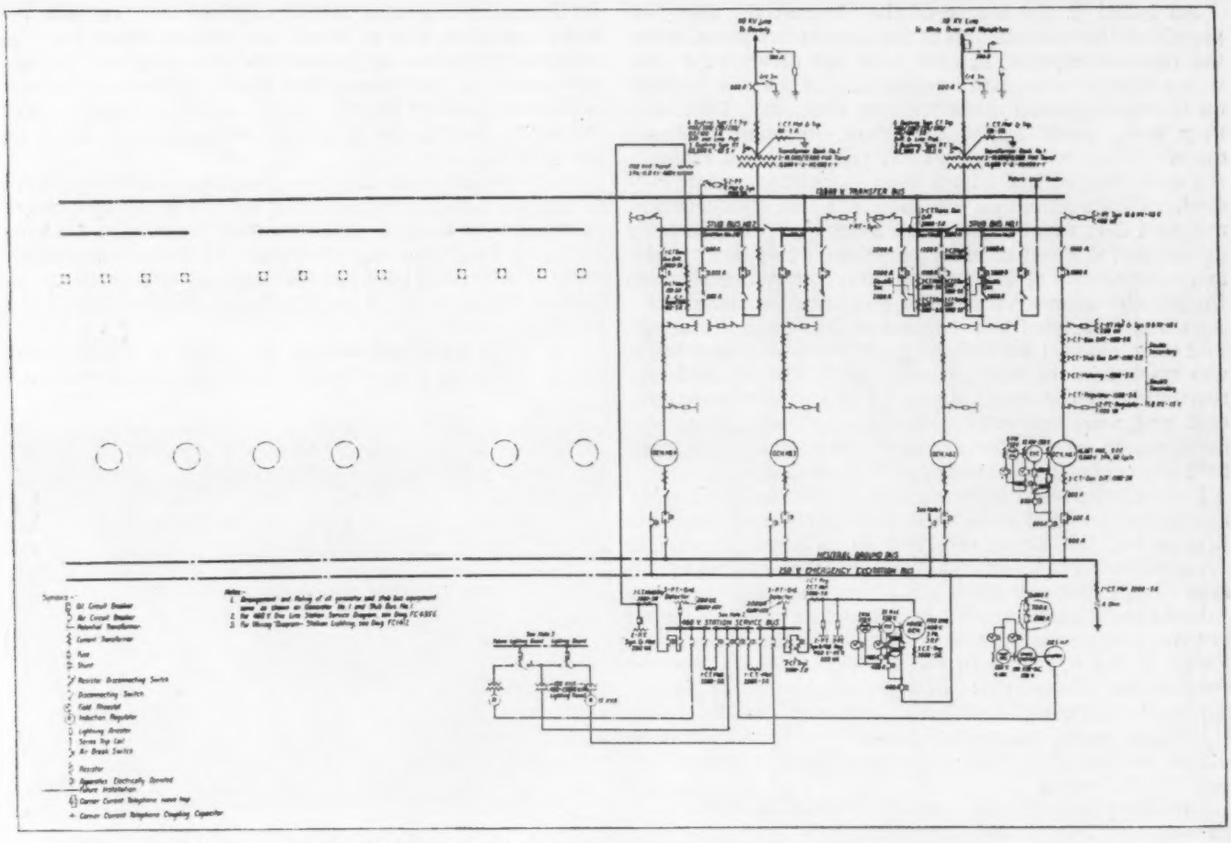
All 13,800-volt oil circuit breakers, which are Westinghouse Electric & Manufacturing Co. type 0-33, are located in the electrical bay on the roof of the generator room. Kerite cable run in fiber conduit is used for the connections between the generators and the electrical bay. Bus work and tap connections in the electrical bay consist of copper bar work mounted on insulators and provided with phase barriers.

No 110-kv. oil circuit breakers are provided for the transmission lines, which will be operated as a unit with the main power transformers. The 13,800-volt switching is arranged to give a maximum of flexibility and is so connected that nominally one transformer bank is fed from two generators but may be tied to the transfer bus and receive power from other generators up to the limit of the bank capacity.

Two banks of three single-phase transformers and one spare transformer are located on the roof of the genera-



Cross-section through the power station showing the low generator room and the arrangement of the control terminal room in relation to the control room proper



One-line diagram of the existing and future circuits at this station. A pair of generators operates as a unit with one transformer bank and the associated transmission line under normal conditions. High-tension breakers are omitted, transformer secondaries being connected directly to the 110-kv. transmission line

tor room adjacent to the 13,800-volt electrical bay. The transformers, furnished by the Westinghouse Electric & Manufacturing Co., are rated 10,000 kva. self-cooled, 15,000 kva. forced air-cooled, 63,500/13,800 volts, single-phase, 60 cycles for connecting in a 110,000-volt Y bank. Taps are provided for 120,000-volt operation and the high-voltage bushings are equipped with potential taps and networks for voltage indication and relay operation. In this installation it proved more economical to purchase forced air-cooled transformers which will require operation of the blowers most of the time than it would have been to purchase more efficient transformers of larger self-cooled rating but of greater cost.

A conduit space between the lower floor of the electrical bay and the roof of the generator room has been provided to facilitate running control circuits both present and future. Beneath the control room a conduit room contains terminal boxes to which the control conduits are brought. In these boxes are mounted all instrument, control and synchronizing buses, instrument and control fuses and terminal blocks, from which the wires are carried directly up to the base of the control switchboard in conduits. This arrangement permits of a neat looking wiring job on the back of the switchboard, and provides a convenient localization of all connections.

The control board is constructed of steel and is of the vertical circular type, with the control and instrument panels in front and the relay panels in the rear.

Because of the possibility of obtaining waterwheel outputs in excess of the generator rating at high heads, complete governor load limit control and indication for each unit is provided at the control board so that the maximum output will be under the control of the switchboard operator.

Generator voltage regulators are of the high-speed exciter rheostatic type and each main exciter is equipped with a pilot exciter to provide rapid field changes on the main exciters and do away with the need of a generator field rheostat. Exciter field rheostats and field breakers assembled in groups for each pair of generators are located in the generator room.

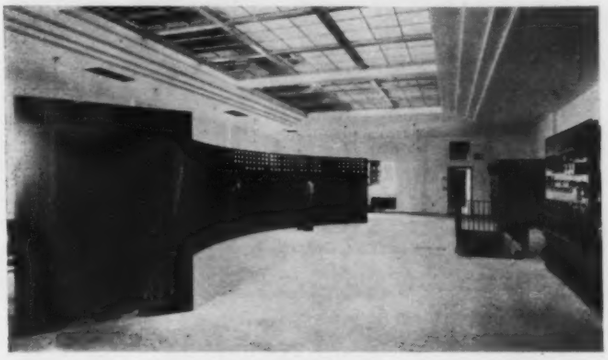
Station service power may be obtained from the 1,750-kva. service generator or the 1,750-kva., 13,800/460-volt transformer bank. Power is distributed at 460 volts from the sectionalized station service bus through feeder circuits controlled by manually operated air circuit breakers. Air circuit breakers, used to connect the bus sections and power sources, are electrically controlled from the main control board.

All electrically driven auxiliaries such as governor oil pumps, air compressors, drainage and unwatering pumps, oil purification equipment and ventilating fans are controlled by contactors located in group cabinets. Electric power is also used to a certain extent in building heating, gate guide seal heaters, trash rack heating to prevent formation of ice on the rack bars, and gantry cranes for lifting gates and stop logs.

All generators, transformers and buses are provided with current differential protection. The two out-going high-tension lines are provided with high-speed impedance relays and overcurrent ground relays, which trip the breakers on the 13,800-volt side of the transformer banks. In order to help maintain system stability, these breakers are of the high-speed type which will break the arc in eight cycles from the time of relay operation. The station service transformer bank is also equipped with overload, reverse power and overfrequency pro-

tection, the last two being provided to prevent interruption of station service power in case of severe system disturbances when both the service generator and the service transformer bank are being used.

Generator voltage regulators are supplied with overvoltage protection to limit the generator voltage on overspeed. A d.c. relay connected across the pilot exciter



Main switchboard and control room

trips the generator line breaker and inserts additional resistance in the pilot exciter field upon excessive overspeed.

Indicating lamps in conjunction with bell alarms are used at the control switchboard and generator gage boards for annunciator indication of trouble and danger signals.

The telephone system consists of Automatic Electric Co. type PAX automatic equipment for general plant communication and a manual switchboard for outside public telephone lines and for circuits to the generator gage boards. The telephone circuits between the manual telephone board in the control room and the gage boards at the generators will be used to handle all operating signals between the floorman and the switchboard operator. Carrier current equipment and a privately owned telephone circuit will provide two separate means of communication with the load dispatcher at Seattle.

Power from the new development will be distributed in the more densely populated areas along Puget Sound between Everett on the north and Tacoma on the south. The Beverly Park substation near Everett and the White River hydro-electric station east of Tacoma are both accessible to passes over the Cascade Mountains and will be used as distributing centers. An existing 110-kv. wood-pole H-frame transmission line between the White River station and the Wenatchee substation has been used in the past to supply load in districts east of the mountains and as an interconnection with the line to The Washington Water Power Co.'s plant at Chelan. By a connection from Rock Island power house to Wenatchee one circuit is provided from Rock Island to White River. A second line was built over Stevens Pass to Beverly Park along approximately the same route as taken by the electrified Cascade section of the Great Northern Raliway. Initial operation on this circuit will be carried to Skykomish where connection to an existing 110-kv. circuit will carry power to Beverly Park. Details of this transmission line are covered in a preceding article. (ELECTRICAL WEST, Nov. 1, 1931, p. 236.) A 25,000-kva. synchronous condenser is installed at Beverly Park substation for maintaining voltage. Additional transmission and condenser capacity will be provided to care for future expansion at Rock Island.

The entire Rock Island development including the dam, power house, transmission lines and synchronous condenser installation is being designed by the Stone & Webster Engineering Corp. and the initial development is scheduled for completion Aug. 1, 1932.

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New Books

ALTERNATING CURRENTS, by C. E. Magnusson, Ph.D., professor of electrical engineering, University of Washington, Seattle. Fourth edition. Cloth-bound; 6 x 9 in.; 685 pages; illustrated. Published by McGraw-Hill Book Co., Inc., New York. For sale by McGraw-Hill Retail Room, 883 Mission St., San Francisco. Price $5.—Fundamental conceptions of alternating-current phenomena are expanded into their practical application in alternating-current machinery. In the fourth edition of this work, the author has included technical presentations of the most recent developments which are illustrated both pictorially and diagrammatically. New chapters on systems of units and symbols, mercury-arc rectifiers, hot-cathode rectifiers and oscillators, and instruments have been added, making a complete treatise on alternating currents.

ELECTRICAL LABORATORY STUDIES, by Walter Lyman Upson, professor of electrical engineering, Washington University. Cloth-bound; 6 x 9 in.; 181 pages; illustrated. First edition. Published 1931 by McGraw-Hill Book Co., Inc., New York. Price $2. For sale by McGraw-Hill Retail Room, 883 Mission St., San Francisco.—Written primarily for junior electrical engineering students, this book covers the basic underlying laws of electrical engineering in selected laboratory studies. Experiments have been chosen with the idea of stimulating the student's interest and arousing a spirit of inquiry not only in standard electrical phenomena but also toward lines of original investigation. The book provides a basis for laboratory study of elementary electrical laws and the operation of direct-current machinery.

PROBLEMS IN ALTERNATING CURRENTS, by Waldo V. Lyon, professor of electrical machinery, Massachusetts Institute of Technology. Cloth-bound; 6 x 9 in.; 225 pages. Second edition. Published by McGraw-Hill Book Co., Inc., New York. Price $2.25. For sale by McGraw-Hill Retail Room, 883 Mission St., San Francisco.—A text book of problems in alternating currents for electrical engineering students. Problems involving the same principles are grouped together and arranged in their order of difficulty. Problems have been well selected so as to require analysis of certain definite conditions and the application of electrical knowledge in their solution. The text is designed to supplement the system of instruction by recitation.

PROBLEMS IN DIRECT CURRENTS, by Waldo V. Lyon, professor of electrical machinery, Massachusetts Institute of Technology. Cloth-bound; 6 x 9 in.; 154 pages. Second edition. Published 1931 by McGraw-Hill Book Co., Inc., New York. Price $1.75. For sale by McGraw-Hill Retail Room, 883 Mission St., San Francisco.—A text book of problems in direct currents for electrical engineering students. Problems involving the same principles are grouped together and arranged in their order of difficulty. Problems have been well selected so as to require analysis of certain definite conditions and the application of electrical knowledge in their solution. The text is designed to supplement the system of instruction by recitation.

VECTOR REPRESENTATION FOR ELECTRICAL METERMEN, by D. P. Canfield, associate professor of electrical engineering, Purdue University, Lafayette, Ind. Cloth-bound; 5¾ x 8¼ in.; 180 pages; illustrated. First edition. Published 1931 by McGraw-Hill Book Co., Inc., New York. Price $2. For sale by McGraw-Hill Retail Room, 883 Mission St., San Francisco.—This book fills the need of a readily understandable text on vector representation of alternating voltages and currents. Presentation of the material is made in four parts, the first being a non-mathematical presentation of the use of vectors and the maniuplation of standard symbols. The three remaining parts expand the introductory material into the application of the vector diagrams to polyphase problems in metering and power factor correction. The book is written not only for the engineer but also for the man with limited technical training who is dealing with electrical circuits.

ELECTRICAL EQUIPMENT, by Harold W. Brown, M.S.E.E., consulting engineer. Cloth bound; 6 x 9 in.; 568 pages; illustrated. Second edition, published 1931 by McGraw-Hill Book Co., Inc., New York. Price $5. For sale by McGraw-Hill Retail Room, 883 Mission St., San Francisco.—This book is designed to familiarize the young engineer with the problems involved in the application of electrical equipment to industrial projects. The second edition has been completely rewritten in order to be in strict accordance with modern engineering practice and to widen its utility among engineers and others interested in the industrial application of electricity.

The various classes of electrical equipment are discussed by presenting a brief outline of their functions, descriptions and operating characteristics, and their applications to industrial problems. The problem of cost and the economic relation of each class of equipment to the installation as a whole are stressed throughout the book. Illustrative practical examples drawn from the author's experience and a list of topics for class discussion are included in each chapter. A new chapter on electric welding has been added and the chapter on "Costs" has been revised to give up-to-date figures on the various classes of apparatus discussed in preceding chapters. The final chapter of the book presents a comprehensive list of problems for each of the preceding chapters to familiarize the student with the engineering principles involved in furnishing electrical equipment for various applications.

Electricity in the New Flotation Plant

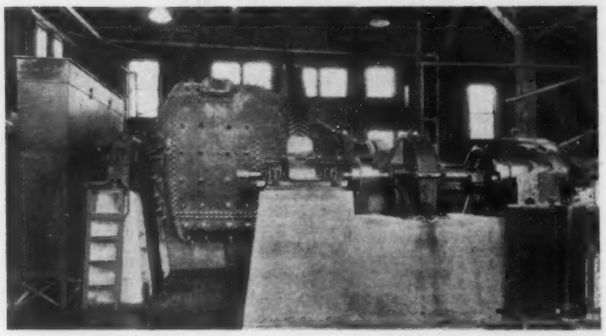
By H. B. TINLING
Tinling & Powell, Electrical Engineers, Spokane

IN ACCORDANCE with modern industrial practice, the importance of the electrical installation was emphasized by the management of the Jack Waite Mining Co. in the construction of its new flotation plant at Duthie, Idaho. As a result, the electrical layout was designed and equipment chosen to effect the greatest operating efficiency in the handling of material through the plant. An element contributing to economical installation costs was the method followed by Tinling & Powell, electrical engineers of Spokane, who engineered the electrical design and furnished and installed the equipment. All the necessary assemblies were constructed in the shop and installed on the job as a unit.

Briefly, the process consists of crushing, fine grinding, and selective flotation of the lead and zinc minerals from the ore. The ore, after crushing and before further grinding, is hand sorted on picking belts for the removal of high-grade minerals.

Power is purchased at 2,300 volts, and is stepped down at the mill substation to the various voltages suitable to operating the mill equipment and for distribution around the mine property. As motors in this plant range in size from 200 hp. to ½ hp., both 2,300 and 440-volt power are brought overhead to the mill and in conduit through oil switches and switchboards to the motors.

Individual drives are used throughout the installation, 38 motors being required for the process. All are Wagner motors, including single phase and three-phase of slip-ring and squirrel-cage types. Eight ¼-hp. 110-volt, single-phase motors drive the reagent feeders. Three-phase motors, all squirrel-cage except one, are served at 440 volts with the exception of the 200-hp. ball mill motor and the 100-hp. motor on the gyratory crusher, which require 2,300-volt service.

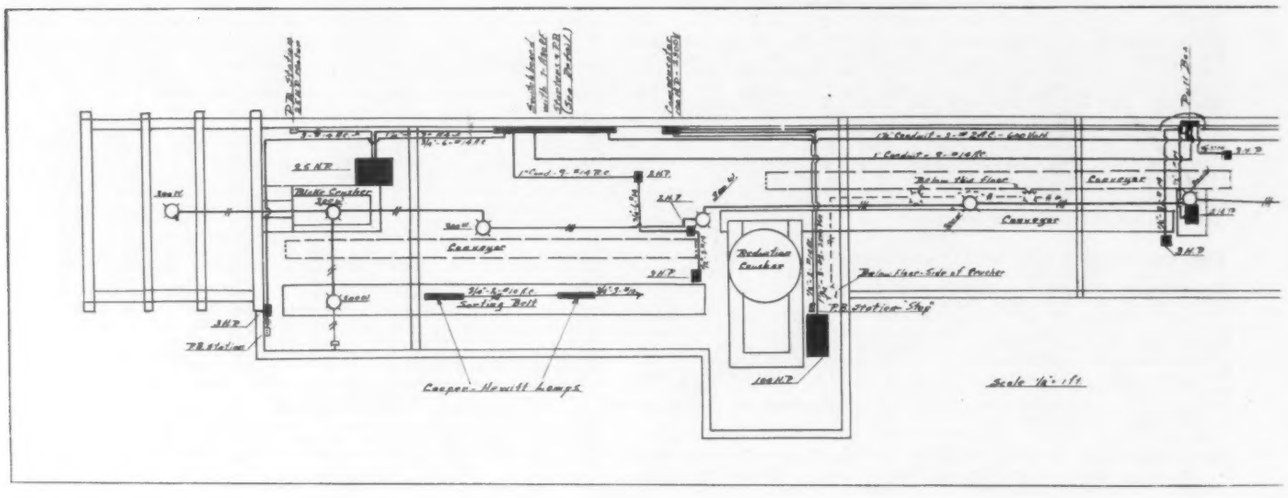


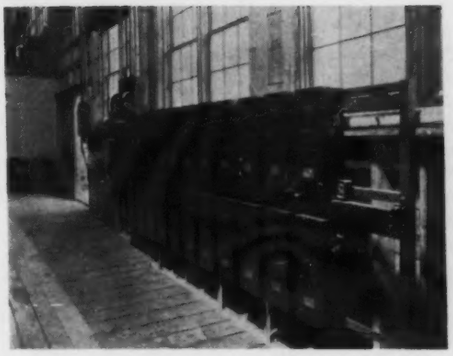
Ball mill drive and control. High-starting torque and accurate slow-speed control is provided in the pedestal-mounted drum switch and associated resistance

The ball mill is driven by a 200-hp. slip-ring motor geared to the mill itself with the drum switch control mounted beside the motor pedestal. This permits the high torque required for ball mill operation, as well as the fine control necessary for spotting the mill in correct positions to change ball and liners. An ammeter placed above the motor oil circuit breaker allows the operator to check the load on the motor and control the feed accordingly. Control for the 100-hp. gyratory crusher motor is a manually operated compensator. All 2.3-kv. motor circuits are backed up with trip free oil circuit breakers arranged for overload protection.

Power service for the 440-volt motors is protected by a 400-amp., 500-volt externally operated safety switch which feeds both the concentrator and crushing plant switchboards. Each switchboard is of unit type construction, being an assembly of Condit combination switches and push-button motor starters. This combination contains a disconnecting switch, fuses, and magnetic starter, enclosed and interlocked so that contact cannot be made with live parts of the switch when the switch is closed. The switch block containing the contacts can be removed for inspection of the contacts or to insure the repairman's safety when work is necessary on the

Below and right— Electrical layout of the flotation plant. Central location for distribution panels facilitates repairs, future changes and additions

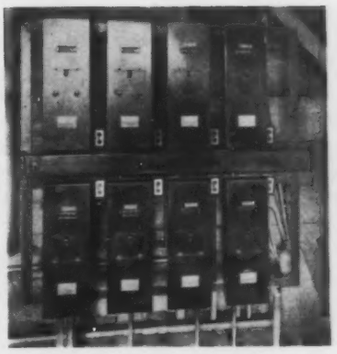


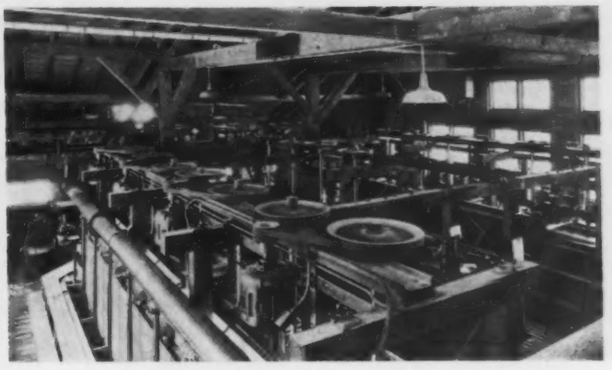


Left and right—Switchboard consists of combination switches and starters mounted on angle iron frame with enclosed bus gutters through center. Each switch box encloses fused disconnecting switch and magnetic starting switch with pushbutton on side

Lower left—Picking belt with mercury vapor lights to help select high grade ore

Lower right—Standard ball-bearing motors, mounted vertically and driving agitators through Tex-rope drives, supplant line-shaft and gears

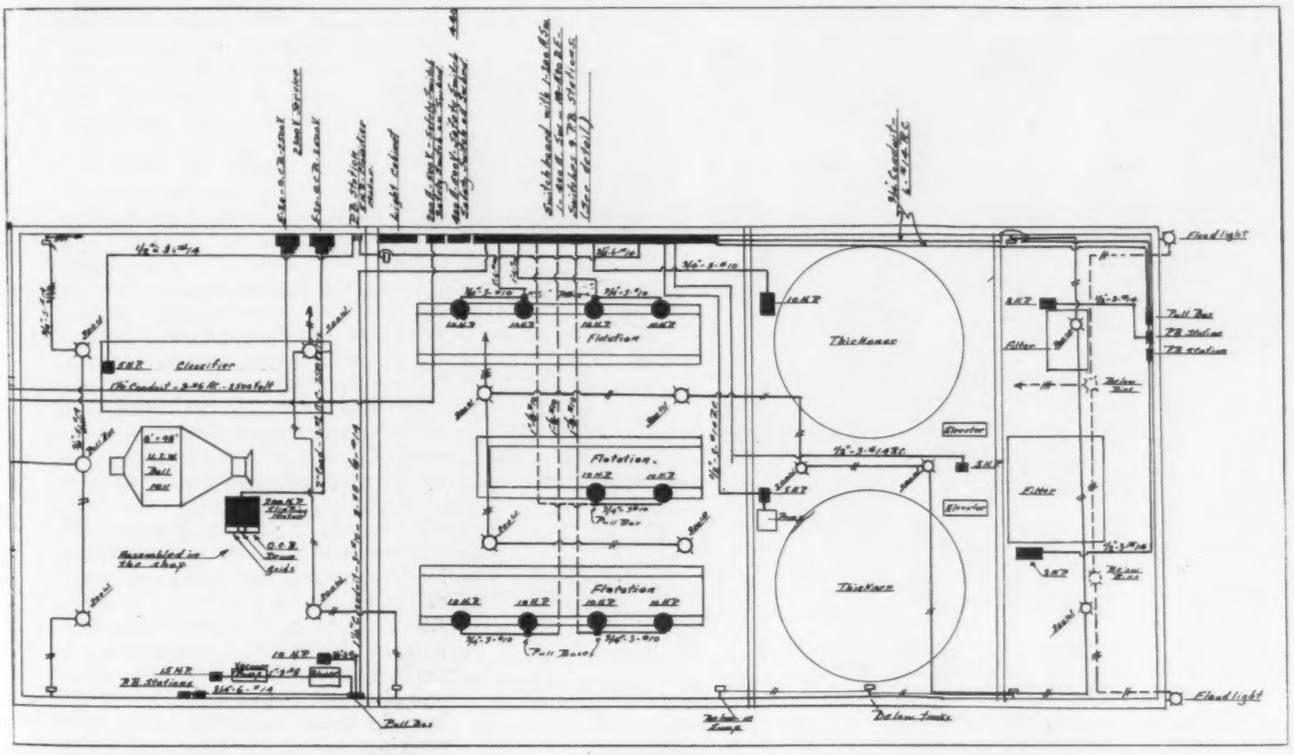




machine or motor controlled by the switch. Switchboards were assembled in the Spokane shop of the electrical contractor and shipped to the job ready for installation.

Two such switchboards are installed, one controlling the crushing plant motors and the other the concentration and flotation motors. Push-buttons are mounted on the switchboard and also placed at locations convenient to the points of operation.

With the exception of the 200-hp. motor, all motors are of the ball-bearing type with a double race bearing on the pulley end of the motor and a single race bearing on the other end. As these are grease-tight bearings it is possible to operate the ten flotation cell motors in



the vertical position, the single race bearing taking the thrust and the double race bearing taking the belt pull. Texrope, short-center drives are used for driving flotation cell agitators, crushers, classifiers, and screens. Other drives are direct.

Particular attention has been paid to the lighting of this installation. Sorting belts are lighted by Cooper-Hewitt mercury vapor lamps, the monochromatic blue light of which brings out the different ores and waste in varying colors. High-grade lead ore appears bright purple under this light and is readily picked out for direct shipment to the smelter. This allows a much greater tonnage to be handled by the mill since only the lower grade ores are put through the flotation process. Standard dome-type reflectors are used throughout the remainder of the mill with 300-watt lamps. Mazda daylight lamps are used over the flotation process to permit the operators to check the operation of the flotation cells closely. All other lamps are standard Mazda type.

From the accompanying layout diagrams features of the installation are apparent. Power and control circuits for each section of the mill are concentrated at one point.

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A Department for the Industrial Electrical Contractor — the Motor Specialist

MOTOR FORUM

An Exchange of Ideas on Economic Electrical, Mechanical and Business Problems

A Question of Motor Economics

Contractors Have Been Accused of Neglecting the Sale of Motors, of Allowing the Business to Get Away From Them. Is This a Fault of Negligence or a Virtue of Plain Business Sense? Only Facts Will Answer

MOTORS may be taken as a symbol of industrial electrical contracting. They are but one of the items that go to make up the business; once the most important single item, it is true, but now just one of many. To the manufacturer a motor represents a product for which a market must be found in order to keep payrolls busy and plant machinery operating. To the contractor the motor represents a piece of apparatus around which his many services revolve—wiring, repairs and rewinding, maintenance work, sale of control and operating equipment. To the consumer the motor is a means of doing labor cheaply and quickly.

Yet in the process by which that motor reaches the consumer from the manufacturer, and the attendant details involved in the transaction, lies everything that means livelihood to the contractor and profit to the manufacturer. Could the details of the process become as simple and direct in operation as this little diagram of distribution just outlined there might again result a situation in which the contractor and the manufacturer were assisting each other to expedite the path of the motor to the consumer to the mutual profit and livelihood of both. As it is today, and has been for some recent years, there occur many difficulties which result in counter resistances and inefficiencies which neither would tolerate in the operation of one of their motors.

Analysis of the design features causing overheated and improper operation of a motor would go along certain definite engineering paths. The problem would be solved by intelligence, not emotion. Facts would count more than opinions or preferences.

Motor distribution is generating unnecessary heat. It is not running at its full rated horsepower. The load of proper distribution is increasing and requires full efficiency. It is time to take stock of the design of the system, to analyze forces and resistances, flux and torque, excess weight and running currents, and to determine whether a more efficient mechanism may be built and operated.

Concern for the efficient operation of motor distribution, and an appreciation of the necessary place in that scheme occupied by the industrial contractor, led to the establishment of a department titled "Motor Forum" in ELECTRICAL WEST. With a change in arrangement of contents so that classifications of material of interest to its readers might be obtained, this department was dropped and the material contained in it merged under the classification heading, "Industrial." That there still remains a need for a definite forum of motor specialists' ideas is given new evidence in the many requests for its return.

Since no problem confronting the industrial contractor or the manufacturer of motor equipment ranks in importance with this primary question of distribution, it is felt that this subject must be faced squarely before any other. While so many revolutionary changes are taking place in the entire electrical industry, it is important that the facts concerning motor and control distribution, its costs, its service requirements, its implications, and its future be placed face up on a common round table and examined. But of this scrutiny can come order and good faith.

Too little has been known concerning the cost of selling a motor. The manufacturer, lacking accurate factual analysis, has set arbitrary discounts and then further vitiated even these by competing directly with his own customer in the sale. The motor dealer, untrained to dig out fully the facts about his own real expenses, strives to determine whether he can afford even to stock the motor for sale in this changing order of affairs. Both lose because of inevitable misunderstandings and wastes, because of duplicated effort and expense. In the interests of sane and economical development of industrial electrification, a series of studies of the problems of both will be presented here.

Beginning in the next issue, the editors will begin that process. It will begin with some analyses made by Frank Boyd, formerly manager of the industrial division of General Electric Co., in San Francisco, and now an independent contractor, a partner in the firm of Pacific Electric Motor Co., at Oakland. Mr. Boyd brought to the industrial motor contracting business a long experience

as a manufacturer's executive, a keen analytical faculty, a knowledge of cost anlysis and accounting, and a business sense that has spelt success for his firm in face of declining industrial plant installation work. He made a complete review of his company's operations for three years and after careful checks had been made of every item and allocation of expense, this review was published in *Electrical World*.

Since that time another year has rolled by, and this year's figures are now available. Moreover, a complete investigation of a number of issues raised by the first article have been studied. The answers to these issues are pertinent.

Such a series, no matter how balanced in judgment one man might be, would not be entirely fair or complete without reporting in it other views and facts. Therefore every effort will be made to get from the manufacturers and from other contractors, similar frank and factual statements. In this sense these articles will become truly a forum in which all sides of what sometimes assumes the air of a controversy may be presented and heard.

"I have felt for some time" writes J. O. Case, president of Quality Electric Co., Ltd., Los Angeles industrial contractors, "that because of better protective methods (in motor design) and better installation practices the motor repair game is bound to decrease in volume. It is up to the motor-specialist who has relied on this work for any appreciable percentage of his business to develop other lines if he intends to stay in business."

Other contractors have expressed themselves that they were about to make analyses of their business operations and from these determine which lines of their endeavor were unprofitable and should be eliminated. If motors are an unprofitable item under present discount policies, as motor specialists claim, an important factor in distribution will abandon the manufacturer at a time when he has need for all the sales assistance he can get. On the other hand, discount schedules should not be revised without due regard to actual sales costs and conditions. New franchise policies are in the making. Should not these be determined upon a basis which will be mutually advantageous to dealer and manufacturer?

There is all too little knowledge on the part of dealer and manufacturer of the other's problem, of his costs of doing business, of his legitimate channels of distribution, of the manner in which each may assist the other to better advantage. There have been encroachments in each other's field, without due regard for the true economy of such expansion. Dealers have gone into manufacture and manufacturers have gone into sales and have established service shops. Perhaps neither would have been necessary if both had had a clearer understanding of the other and had strengthened each other in the points in which they were weak and which thereby invited this invasion of their respective fields of activity.

The first article of this economic series will appear in January. Needless to say, ELECTRICAL WEST invites participation by anyone who can contribute something tangible to the discussion. Platitudes and generalities will do little good. Facts and ideas will prove of real benefit.

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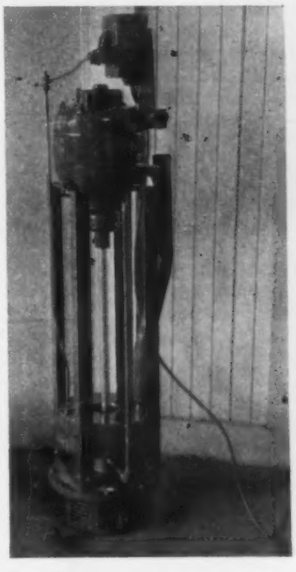
For Bailing Out Basements

DRAINAGE of basements of residences presents a problem which a small automatic sump pump, not too expensive and yet efficient, would go a long way toward solving. The North Bay Electric Works, motor dealers and contractors in San Rafael, Calif., have devised such a pump assembly and make it up in several sizes. They find a ready market for these automatic pumps in many places where drainage seeps into basements of Marin County residences.



The pump illustrated is more or less a standard model and stands 2 ft. in height. It utilizes a ¼-hp. motor, above which is mounted a Trumbull motor-starting switch. The switch tumbler is actuated by an arm which is moved up and down by the float below. The float is a copper cylinder with a hole through its center to allow the shaft of the motor to operate the centrifugal pump, which is at the base of the unit. A thrust bearing mounted just under the motor suspends the weight of the motor and the pump below. A framework of angle iron, arc welded in place, acts as a guide for the float. Oil and grease pipes are provided to keep the bearings of the centrifugal pump lubricated. The capacity of this ¼-hp. motor-driven pump is 10 gal. per minute at a 20-ft. head.

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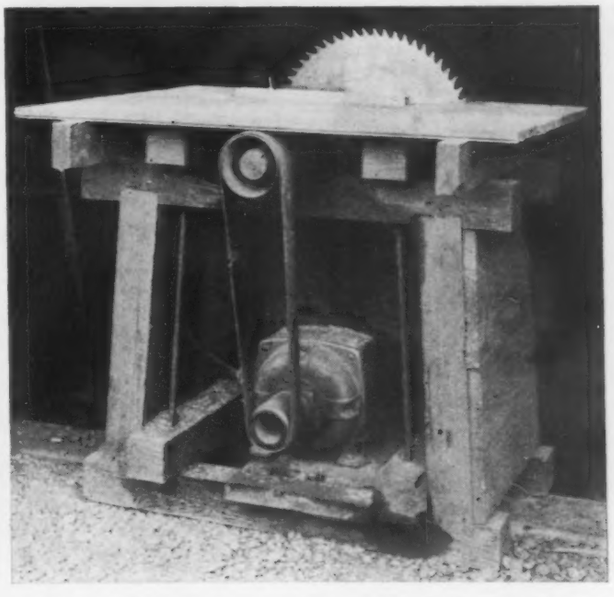
New Use for Old Motor



ANOTHER use for the old motor is in the general utility farm saw. The outfit pictured here cost but $15, using the old motor, a few parts, and a little ingenuity. The saw cut a good many cords of wood last winter, and will do the same for some time.

P.C.E.B. Sponsoring Inspection Trips to Industrial Plants

ONE of the most important activities of the industrial electrification committee of the Pacific Coast Electrical Bureau is the arranging of a series of inspection trips to various industrial enterprises in the San Francisco Bay area. The first of these trips took a group of industrial engineers to the new Ford Motor Co.'s plant at Richmond on Oct. 27.

Desire to familiarize manufacturing management and engineers with the possibilities of electrical application led to the adoption of this program, which supplements the usual inspection trip with many additional features. To insure reaching industrial executives and engineers, a selected list was compiled, to which would be sent invitations to the "open house" to be held at various plants.

With each invitation is enclosed a return post card upon which the recipient may indicate his acceptance as well as the probable time of his arrival at the plant. This not only gives an idea of the expected attendance but also furnishes a check of both men and industries interested in the program.

As the visitors arrived at the Ford plant, they were segregated into small groups for the inspection tour. Each visitor was provided with a program listing the points of interest in the plant, and a post card upon which he could indicate subjects about which he desired additional information. As the groups progressed through the plant they were stopped at the various points of interest listed on the program. Members of the committee and representatives of the factory management were stationed at these points to discuss the features of the electrical apparatus then under observation and to correlate the electrical installation with plant operation. Thus the importance of the electrical installation to plant efficiency and production will be stressed in each of the inspection trips made under the auspices of this committee.

With the cooperation of the Ford company officials, the first trip under the industrial electrification committee's plan was carried out in comprehensive detail. C. A. Bulwinkle, district manager of the Ford Motor Co., and his staff of officials lent every effort to the committee to insure the success of the trip. Invitations were sent out from a list comprised of 1,700 names taken from the industrial mailing lists of the larger manufacturers and the industrial information made available by the Pacific Gas and Electric Co. Over 300 acceptances were promptly returned to the bureau, practically all of them indicating that the time of arrival would be within 1 hr. of 1:30 p.m., the opening hour. Arrangements were then made to take care of this number of visitors. In cooperation with the Ford company, the routing of touring parties was arranged, and a sufficient number of guides was provided by the Ford organization.

Inspection in the Ford plant was made of the following:

Boiler room
Lighting
High frequency tools
Lighting distribution system
Material handling methods
Natural gas utilization
Power distribution methods
Primary voltage switchgear
Safety features
Secondary voltage switchboard and control
Special automatic instrument control
Transformer installation
Welding
Window and door control
Tool room appliances and control

At each point a speaker fully conversant with the features involved presented a short address to the group as it passed along the room.

Comments made by those attending indicated that they were very favorably impressed with what they saw. The large number of return post card requests for additional information on certain types of electrical application further bears out this interest. As practically all phases of the industrial application of electricity were covered in the trip through the Ford plant, visiting executives and engineers were given an excellent idea of the importance of an adequate electrical installation. The response and interest aroused by the "open house" were gratifying to the committee, which is headed by Frank Boyd of the Pacific Electric Motor Co., Oakland, and the plant visitation committee, who made the arrangements for this inspection, consisting of C. D. Herbert, chairman, George Duncan, and E. Ernest Peterson. The activity of the committee will be carried on throughout the year by sponsoring similar trips to other industrial enterprises.

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DECISION IN PIT RIVER DAMAGE SUITS GOES TO P. G. AND E. CO.—A decision in favor of the Pacific Gas and Electric Co. has been handed down by the third District Court of Appeals of California in its reversal of the Shasta County Superior Court's decision in litigation over water rights in the Pit River country. The Superior Court had awarded $65,000 to W. J. Albaugh, and $20,000 to Merton Crum, owners of land.

Santa Cruz Decision Sets Precedent

What is considered one of the most important victories yet won by the proponents of municipal ownership in California is the recent decision of the district court of appeals upholding the right of the City of Santa Cruz to finance the construction of its water system and power plant entirely from the revenues of the plant, and to pay for it over a period of years, without the necessity of a two-thirds vote at an election.

The City of Santa Cruz entered into an agreement with Fairbanks, Morse & Co. to construct a water system and power plant for approximately $153,000, to be paid in 60 monthly installments. The agreement specifically provided that this indebtedness was not a general obligation against the city, but was to be paid entirely from the revenues of the plant and that the city was to maintain rates which would provide for making the payments specified, so far as it may be permitted to do so by law.

Five citizens of the community brought suit against the city and Fairbanks, Morse & Co. on the ground that the agreement in effect was creating an indebtedness against the city without having been authorized by a two-thirds vote of the people. The superior court held that the city council was within its constitutional rights in making the contract with Fairbanks, Morse & Co. The district court of appeal, in upholding the superior court decision, held that the indebtedness which requires a two-thirds vote, mentioned in the constitution, is only such indebtedness that is a general obligation against the city, which must be paid from general taxation. It does not apply to an indebtedness which is not a general obligation, and one which is to be paid entirely from the revenues of the utility.

The case is expected to be carried to the State Supreme Court.

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Beverly Hills Rejects Hoover Dam Power

Wth a definite commitment from the Southern California Edison Co. Ltd. that power costs to the city of Beverly Hills, Calif., would be reduced 15 per cent by the time Hoover Dam is completed and that 10 per cent of the cut would be effective by Jan. 1, 1934, Beverly Hills voters on Nov. 6 rejected a proposal that the city enter into a 50-year contract with the federal government for Hoover Dam power. The vote was 121 against the proposed contract and 44 in favor of it. There are 6,591 registered voters in the community.

Problematical savings which might have been made by contracting for Hoover Dam power are offset to a major extent by power rate reductions made by the Southern California Edison Co. Ltd. within the past year and

the further substantial reductions which the company has guaranteed, according to a resolution of the Beverly Hills Chamber of Commerce which urged the citizens to vote against the federal power contract. Original estimates of savings to the city through the use of Hoover Dam power as high as $40,000 annually were shown by figures based on a number of factors, several of which admittedly were indeterminable. By reductions already in effect by the Edison company the estimated saving was cut to $30,000 while the commitment made by the company will reduce the possible saving to about $15,000 a year. Contract for Hoover Dam power also would have made necessary the construction of a transmission line from a Southern California terminus, involving a bond issue of approximately $300,000.

The cities of Riverside and San Bernardino likewise have voted to refrain from contracting for Hoover Dam power.

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Reduction Follows City's Study of El Paso Rates

An agreement has been reached between the El Paso (Tex.) city council and the El Paso Electric Railway Co. whereby the rates of the power company are to be reduced immediately $85,000 and a further reduction of $56,500 is to follow as soon as the company's revenues return to the 1930 level. The two reductions will result in a saving to domestic consumers of approximately 15 per cent.

The rate reduction is the direct result of a report made to the city council of El Paso by the Burns & McDonnell Engineering Co., of Kansas City, retained by the council to make a survey of the company's rates. The report stated that the city could erect its own electric generating plant for $6,170,000, operate it for $1,532,050 annually, and with an estimated income of $1,787,800 could pay 7 per cent interest on the investment, allow 3½ per cent for depreciation annually, and still save $255,750 a year for the consumers of the city. A similar opinion was rendered with respect to the city operating its own gas business.

A series of conferences between members of the council and officials of the power company followed the receipt of the report in an effort to effect a satisfactory adjustment of rates. Three different compromise figures were considered. M. C. Smith, manager of the power company, said that the only consideration on which his company accepted the reduction finally agreed upon was the hope that the company, through reducing its rates, can increase its business, and its desire to be friendly with its patrons and "a good citizen of the community it serves." The council agreed that a compromise was better than long-drawn-out litigation and the consequent delay in receiving the reduction in rates if the city won the argument.

The power company has agreed, in addition to reducing its electric rates, to pay $8,500 which it cost to have the rate survey made by Burns & McDonnell Engineering Co.

Rates to large commercial consumers of the El Paso Electric Co. were reduced July 1 last, and a reduction in the rate for electric power used by cotton gins served by the company which became effective Sept. 1 has effected a saving of from 10 to 15 per cent for valley ginners during the current season.

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San Diego Council Acts On Street Lighting

An ordinance adopted by the city council of San Diego Oct. 26 practically amounts to an offensive by the city against the San Diego Consolidated Gas & Electric Co. The ordinance provides for calling of bids for a municipal power plant to supply energy for the downtown ornamental lighting district, and also for the calling of an election on Dec. 15 to amend the power company's franchise to enable the people to exercise a referendum on it. The people will also be asked to amend the franchise so the city may collect 2 per cent franchise tax on money paid by the street railway company to the power company for electrical energy.

In addition to adopting the ordinance, the city council unanimously asked that the Railroad Commission hold a hearing on the rates and practices of the San Diego Consolidated Gas & Electric Co.; it also instructed the city manager to find out why previous instructions relating to the matter of putting wires underground in the downtown section had not been obeyed by the power company.

The decision to call for bids on a municipal plant to supply power for the downtown lighting district followed several weeks of negotiation, including investigation of the cost of supplying power by means of a diesel plant and the opinion given by Lester Ready, consulting engineer, that the installation of such equipment would increase the charge for street lighting service during the first five years' operation by about $30,000. (See ELECTRICAL WEST, Oct. 1, 1931, p. 196.)

In addition to Mr. Ready's report the council had under consideration two reports filed by D. L. Bissell on the utility rate situation. One report asserted that the city was being charged more for ornamental lighting than the power company would charge a householder for the same amount of current, and the second report recommended that the capital and rate structure of the power company be investigated. The council's action on Oct. 26 culminated a bitter fight among its members. J. V. Alexander, vice-president of the council, led the faction which stood for city-owned street lighting.

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Boring Through Oak Grove Tunnel

EARLY in November over 1,900 linear feet of the 3.7-mi.-long tunnel on the Oak Grove project of the Portland General Electric Co. had been driven by Sullivan & Doyle, Portland contractors, on their contract covering the first 3,500 ft. of this tunnel. The tunnel, which is eventually to be lined with concrete, is horseshoe shaped with an inside diameter of 12 ft. unlined. It will deliver water from the main fork of the Clackamas River to the present intake of the Oak Grove plant, and will permit the installation of a third 35,000-kw. unit at this plant. The tunnel job is planned to extend over three years.

Idaho Pioneer

Float of the Idaho Power Co. in a Pioneer Day parade held in Boise Sept. 15, 1931, on the occasion of the dedication of the new Oregon Trail bridge across the Boise River. Many striking examples of the advance of civilization were brought out in the industrial division of the parade, which followed the pioneer division devoted to a depiction of life in the days of Westward migration by wagon

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Municipality Held Immune From Anti-Trust Law

A decision handed down by the Supreme Court of Idaho in favor of the City of Idaho Falls in a suit instituted by the receivers of the East Idaho Gas Co. against the city for alleged violation of state anti-trust laws, is believed to constitute a precedent, and to establish to a degree the immunity of municipally owned utilities from the restrictions of such laws.

The Idaho Supreme Court's opinion stated that the chief question raised was: "Are municipal corporations amenable to the Anti-trust Law and was it the intention of the Legislature to include municipal corporations therein?"

The court argued that "a careful examination of the act discloses that it was clearly the intention of the Legislature that the use of the word 'corporation' therein was to be limited to private corporations and not to include municipal corporations, and numerous provisions contained therein negative the contention of appellant (the East Idaho Gas Co.) that it has application to and includes municipal corporations."

The gas company holds a 50-year franchise in Idaho Falls to supply artificial or natural gas, except for lighting purposes. The cause of action was the establishment by the City of Idaho Falls, which owns and operates an electric light and power plant, of a water heating rate *for users of electric ranges only* of $2 per month for each 1,000 watts capacity of tank heater, a price far below the cost of supplying the current, according to the gas company. It is alleged by the gas company that the city first offered the rate to electric range users from April 1 to Oct. 31 each year, and later extended the time limit "until further notice". The gas company maintained that this action was taken by the city "for the purpose of monopolizing the business of selling public utility heat units in Idaho Falls" and driving the gas company out of business, and that it actually had prevented it from contracting for the sale of gas in sufficient quantities to pay the cost of operating its gas manufacturing and distributing plant.

The suit, which has been in the courts for four years, had been appealed from the Bingham County District Court, which had also decided in favor of the City of Idaho Falls.

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P. G. and E. Wins Modesto District Decision

Application of the Modesto Irrigation District of California that the Pacific Gas and Electric Co. be compelled to withdraw its electric power service from that district, and thus cease from competing with the district in power service, was denied in a decision handed down Nov. 9, by Senator W. J. Carr of the California Railroad Commission.

In the same decision the Commission denied applications of 23 cities and irrigation districts asking that the P. G. and E. Co. be ordered to reduce electric rates in their respective localities to the lower rate schedules now in force in the Modesto Irrigation District. (See ELECTRICAL WEST, Dec. 1, 1930, p. 318, and Feb. 1, 1931, p. 96.) The Commission cited previous decisions of the Supreme Court, the Interstate Commerce Commission and its own body, all holding that a reduction in rates to meet competition at particular points does not constitute unjust and unfair discrimination against other areas that the same utility serves. "To hold otherwise," the decision states, quoting from the records of the California Railroad Commission, "would be to deny the right of a utility company to maintain its own existence by meeting the rates of its competitor."

Denial of the application of the Modesto District for an order compelling the power company to withdraw from its territory was based upon the finding by the Railroad Commission that such an order would violate the section of the Constitution forbidding the taking of private property without just compensation.

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Aqueduct Dynamiting Laid to Vandals

Two sections of the Grapevine canyon siphon of the Owens River aqueduct of the Los Angeles Department of Water and Power were destroyed by dynamiting early Nov. 2. Belief was expressed that the dynamiting was an act of vandals rather than a renewal of the former bitter controversy that prevailed between the city and ranchers of the Owens and Antelope valleys over the city's purchase of water rights. The aqueduct was dynamited nine times from 1924 to 1927, during the city's negotiations for water rights.

The two sections of the siphon blown out totaled 15 ft. in length. The Grapevine canyon siphon is between Indian Wells and Little Lake, 50 mi. from the town of Mojave. Flow through the aqueduct was shut off at Haiwee reservoir, 40 mi. above the break. Repairs to the two sections were completed Nov. 5 and flow of water to Los Angeles city reservoirs was resumed on that date.

Investigation of the dynamiting by the Los Angeles Department of Water and Power, city police and Los Angeles and Kern County authorities, had proceeded without an arrest up to the time that ELECTRICAL WEST went to press, although several suspected persons were being sought. These included a so-called labor agitator and a former employee of the Department of Water and Power.

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REHEARING GRANTED IN P. G. AND E.-HAT CREEK FARMER CASE—A rehearing has been granted by the California Supreme Court to the Pacific Gas and Electric Co.'s subsidiary, the Mt. Shasta Power Corp. on the court's recent decision which made permanent a temporary injunction granted L. P. Joerger, a farmer with land riparian to Hat Creek. The injunction restrained the power company from diverting the waters from Hat Creek in the operation of its Hat Creek power house No. 2, which has been inoperative since the granting of the injunction. The rehearing was granted on appeal of the power company.

Electrical Hotbeds on Trial in Northwest

Meeting success in experimenting with the heating of hotbeds by means of electricity, Lane County (Ore.) truck gardeners are now preparing to extend this method of vegetable culture by constructing and utilizing a series of electrically-equipped beds for the production of Bermuda onions and other plants which require a high soil temperature.

James Bros., truck garden specialists, cooperated with the Oregon Committee on the Relation of Electricity to Agriculture in the inauguration of the new hotbed system, and the latest experiments were carried on with beds 6 x 15 ft. each. Further experiments will be conducted with four different types of installation to determine the method which will give the most heat with the minimum of current consumption. In one instance the heating elements will be buried in cinders. In a second they will be confined in ordinary clay tile, while especial study will be made of several different kinds of heating wire to be used in order to learn which will give the most efficient service under the unusual conditions.

In conducting the most successful experiments so far the temperature of the soil was so controlled that it never fell below 70 deg. F., and it is the opinion of those engaged in making the tests that, eventually, it will be possible to cultivate and raise in the Northwest a great many of the vegetables formerly grown only in southern climates.

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Tacoma Engineer Will Appeal Discharge

V. R. Rathbun, engineer for the Tacoma city light department and resident engineer during construction of the new steam power plant on Hylebos Waterway, has filed notice of appeal from his recent discharge by Commissioner Ira S. Davisson of the public utilities department. Mr. Rathbun was discharged, and Kenneth Danstrum, instrument man, suspended, as the result of an investigation of responsibility for acceptance by the city of faulty concrete construction of the condenser intake of the steam plant, a structure outside the plant proper, where cooling water is admitted from Hylebos waterway.

Unwatering of the condenser intake of the steam plant offered actual proof that the concrete of the intake floor slab was defective, and the source of the sand and gravel that got into the condenser on its first test several months ago. This concrete slab also was found to be too high, with only a foot of clearance between it and the condenser intake pipes, instead of the specified 30 in.

Commissioner Davisson charges that Mr. Rathbun failed to perform his full duty in that he did not personally inspect the intake bottom. Mr. Danstrum is charged with having allowed the floor of the intake to be poured too high with relation to the intake pipes.

Meantime the board of engineers named by Commissioner Davisson to decide on the best procedure for rebuilding or repairing the defective condenser intake of the new steam plant has reported to the city council, and a call for bids will be issued for repair on two recommended plans. Indication that the repairs may be costly is noted in the request of Commissioner Davisson that an emergency ordinance appropriating $50,000 be passed.

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New Rule Governs Line Extension in Colorado

Changes in Rule 42 A of the Public Utilities Commission of the State of Colorado, effective Nov. 1, now make it incumbent on every utility operating under the Commission's jurisdiction to build all extensions requested whenever the expected revenue for a definite period from the rates applicable, or from said rates amplified by sufficient additional guaranteed revenue, justifies such extension. Unless a utility files an acceptable extension policy written in accordance with the provisions of the new rule (which apparently anticipates every contingency) it cannot protect itself against making extensions it may deem unprofitable if they are within the territory it has elected to serve and the prospective consumer asks for service under the rate schedule applicable. In no event is a utility to be longer permitted to force in whole or in part any form of consumer financing as contingent upon the building of an extension except as it appears in Rules 42A and 42B.

Under the former rule there was a wide divergence in the extension practices of Colorado utilities, causing frequent complaint. The changing of the rule followed an extensive study by the Commission and its electrical engineer, H. B. Dwight, of the rural line extension plan of the N.E.L.A. and extension policies enforced by commissions in other states.

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PORTLAND GENERAL ELECTRIC CO.'S fifteenth 11-kv. cable, crossing Willamette River in Portland, was installed recently between Station "L" on the east side and Jefferson substation on the west side to give increased capacity to the west side business district. The crossing is 1,650 ft. long, the cable used being three-conductor, 400,000-circ. mil, with ⅝ in. of rubber around each conductor and no belt, with 9/64 in. of lead, and armored with No. 4 steel wire. Though the loading of the cable and the pulling in of shore ends took from 5 to 6 hr., the actual placing of the cable in the river took only 7 min. The special cable barge of The Pacific Telephone and Telegraph Co. was used in the operation.

Silver Creek Power Deal Made by P. G. and E. Co.

An agreement has been reached whereby the Pacific Gas and Electric Co. will lease from the Sacramento (Calif.) Municipal Utility District the water to be impounded at the proposed Silver Creek dam and use it for the generation of power. Under the agreement the Utility District will bond itself to build conduits and tunnels to bring water to the power house which the company will build at the mouth of Brush Creek. The power company will pay for the water at the rate of 3¼ mills per kw.-hr., measured at the switchboard, and an annual charge equal to 10 per cent of its capital investment to cover interest, cost of operation, maintenance, depreciation and similar items. It is estimated that the arrangement will produce a net revenue of $400,000 annually for the district.

The Pacific Gas and Electric Co. will spend approximately $2,500,000 on the Brush Creek power house, which will have a capacity of between 26,000 and 30,000 hp., this cost including penstocks and transmission lines.

For some time the City of Sacramento has been endeavoring to secure the sanction of its voters for the so-called Silver Creek project. Under the original plan the water would have been stored in the Union Valley reservoir at a point near the mouth of Silver Creek and carried from there to Sacramento in closed conduits. Under the new plan the water will be diverted from Silver Creek at a point farther up in order to provide a greater head for the Brush Creek power plant.

A special election will be held in Sacramento Dec. 16 at which the voters will be asked to approve a bond issue of $10,800,000 for the construction of the water project and one for $1,800,000 for the construction of the Brush Creek conduit and tunnels.

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Dry Ice to Be Made From Steam Plant Gases

Using by-product stack gases from the Pacific Gas and Electric Co.'s Station "A" steam plant in San Francisco as raw material, the California Carbonic Ice Co. plans to erect a 50-ton solid CO_2 plant adjacent to the steam plant, about Jan. 1, and to have the plant in production about April 1. The usual source of CO_2 for manufacturing the solid product has been fermentation or from the burning of coke. The proposed plant is said to be the first to use by-product gases from a plant burning natural gas.

Four million pounds of CO_2 are estimated to be available each day. The gas is free from sulphur, which simplifies purification. While it contains large amounts of water vapor it is planned to condense this to obtain a distilled water of high purity to be used as boiler make-up water for the power plant.

More Funds Needed for Colorado River Study

That further funds will be necessary to make a proper and complete investigation of the resources of the Colorado River basin, was the decision of the Colorado River planning commission at a meeting held in Salt Lake City Sept. 14, under the chairmanship of Porter J. Preston, engineer for the United States Bureau of Reclamation.

In line with this decision, it was further decided that while the present appropriations will be utilized to the greatest possible extent, the six states directly interested should make proper representations to Congress to obtain further funds as they may be required. Four of the six states, namely New Mexico, Nevada, Utah and Colorado, were represented at the meeting.

The tentative general plan for the investigation of the Colorado River basin, as presented at the meeting by Mr. Preston, included a composite summary of the work on projects in each of the six states, and was adopted with the provision that Mr. Preston could modify it as special exigencies or circumstances might require. Mr. Preston, stated, however, that present appropriations will be exhausted by June of next year, and it would therefore appear that the extent of furtherance of the work beyond that time would depend upon the extent of further appropriations.

It was agreed that neither the present appropriation of $125,000 nor the authorized $250,000 will be sufficient for the authoritative formulation of such a comprehensive plan of development as is desired.

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New Rates Announced For Puget Sound System

The Puget Sound Power & Light Co., Seattle, has put into effect a rate reduction applicable to more than 125,000 surburban and rural power and light users on both sides of the Cascade Mountains, with a saving to these consumers of approximately $400,000 a year. According to President F. J. McLaughlin, the new rates make schedules in all such communities served by his company virtually uniform.

With a maximum of 4c. per kw.hr., the new rate supplanted Nov. 1 a tariff varying in different sections from 6c. to 4½c. per kw.-hr.

Rates for residence lighting will be changed Jan. 1. In western Washington these will be 5½c. per kw.-hr. for the first 40 kw.-hr.; 3c. for the next 110 kw.-hr. and 2c. per kw.-hr. for all in excess. This reduces the maximum from 6½c. and 6c. to 5½c., and the maximum kw.-hr. period from 60 to 40.

On March 1 maximum commercial lighting rates will be cut from 6½ to 5½c. per kw.-hr. Details of this schedule are being worked out. New irrigation pumping rates in Wenatchee Valley and surrounding territory will be effective, it is announced, at the start of the 1932 irrigating season in March or later. The reductions, the company states, will make economically feasible high-lift pumping to areas now barren.

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New Unit to Be Added To Seal Beach Station

Plans for the installation of a 50,000-hp. generating unit in the Seal Beach steam-electric plant of the Los Angeles Gas and Electric Corp. have been announced by Addison B. Day, president and general manager of the corporation. The new unit, to be built at a cost of $3,500,000, will bring the capacity of the station to 148,000 hp. Mr. Day announced that work on the addition would be started about Jan. 1, 1932. Continued growth of the corporation's electrical business, he said, necessitates planning for the new unit at this time.

Work to be done in connection with the installation of the new generating unit includes the construction of a 117 x 168-ft. addition to the present Seal Beach station building to house the unit, construction of a new transmission line from the station to the corporation's Eastside substation in Los Angeles, and the necessary enlargement of this substation to care for the new high line and the additional load.

The new unit at the Seal Beach station will be the third installed since establishment of the station in June, 1925. Capacity of the first unit was 48,000 hp. A second unit of 50,000 hp. was installed in August, 1928. The investment represented in the station will be brought to approximately $12,000,000 with completion of the new unit, Mr. Day said.

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Pepco Women's Activities In Full Swing

Opportunity for study and recreation by the women employees of the Portland General Electric Co., Portland, has opened up rapidly in recent weeks through the department of women's activities directed by Marguerite Butler. Classes in home lighting, gymnasium, dancing, swimming and bowling have all been organized within the past month.

Forty of the women have enrolled in a free class in home lighting, designed to teach the fundamentals of electricity and illumination with particular reference to their use in the home. The course, which is divided into ten lessons given one each week, is presented by W. E. Potter, Northwest representative of the National Lamp Works, and T. W. Fitch of the company's illuminating engineering department.

Through special arrangement with the Y.W.C.A., classes in gymnasium, classical dancing, tap and soft shoe dancing, and swimming have been arranged for the Pepco women at special prices to run throughout the winter. Twenty-five girls have taken advantage of one or more of these offers. Bowling has also become popular among the girls in the company, and following a short instruction period in one of the down-town bowling alleys, a league has been formed with 30 girls participating.

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Lassen Utility District Elects Officers

The board of directors of the newly formed Lassen (Calif.) Municipal Utility District met at Susanville last month and named officers following an election held on Oct. 3 at which formation of the district was approved by a five-to-one vote. (See ELECTRICAL WEST, Nov. 1, 1931, p. 252.) John B. Spalding was elected president; B. F. Lyle, vice-president; and P. J. Hopper, secretary.

First move of the district will be an endeavor to obtain lower electric rates from the Lassen Electric Co. Failing in this, the directors will request the California Railroad Commission to place a valuation on the power company's property so that the District may make plans to take the system over and operate it as a municipal plant.

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NEW SCHOOL TEACHES WELDED BUILDING DESIGN—The General Electric Co. has announced the opening at Schenectady of a school of welding design to teach engineers, architects, draftsmen, etc., both in and out of its employ, methods of designing welded buildings. There is no charge for instruction in the course, which requires approximately four weeks for completion. It is a flexible one and can be adjusted to suit each individual. The course requires that the applicant be an engineer, or have some training in structural design or some experience in the design of riveted structures. It is then only necessary for him to learn the difference between the application of welding and riveting to steel frames.

AN ELECTRIC SERVICE SALESMANSHIP APPLIANCE COURSE, prepared by the International Correspondence Schools, is being sponsored by the educational committee of the National Electric Light Assn., New York. The course is conducted by the correspondence method and is designed for individual study. Fourteen units comprise the course, the first five of which describe basic sales principles and are required. Units 6 to 14 deal with specialized subjects and any seven, eight or nine may be selected. Price of the course with seven electives is $25, with eight electives $27, and with all nine units $29. A three-volume Leader's Guide for instruction in the sales conference method is available at $5. Further information on the course may be obtained by addressing Fred R. Jenkins, 72 West Adams St., Chicago.

24-Hour Appliance Service Crew

THIS uniformed crew from the appliance department of the El Paso (Tex.) Electric Co. services all major appliances handled by the company in an area extending from Hillsboro, N. M., to Van Horn, Texas. Service men are on call day or night for service at dairies, markets and other business establishments, as well as for domestic installations. Periodic inspections are made, which tend to reduce service calls on major appliances to a minimum. The men study continually in order to keep up with latest developments, and the company considers their work of great importance.

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G. E. Broadcasting Daily Woman's Program

The "G. E. Circle," a noontime radio program (heard at 9 a.m. on the Pacific Coast) on five days per week over a nation-wide N.B.C. network of 54 stations, was launched in October by the General Electric Co.

Designed primarily as a load builder for central stations and a sales promoter for electrical dealers and contractors, the program is fashioned along the lines of national women's publications and brings to women practical information regarding household affairs, as well as entertainment. Brief messages regarding electric appliances of all kinds for the home are included in the company's announcement preceding the program.

Grace Ellis, authority on women's affairs, directs the program, and each day takes the listeners on a tour to a foreign home, stressing the differences in daily routine between the American home and that of Japan, Iceland, Tibet and other countries. Leading feminine magazine writers and other features also are included.

A weekly Sunday musical program (2:30 to 3 p.m. Pacific standard time) completes the General Electric broadcasting schedule. Famous singers are engaged for this weekly program, which consists of popular concert songs, sung only in English, rather than arias from the operas.

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CUT ORDERED IN IDAHO UTILITY RATES—Branding rates charged by the Public Utilities Consolidated Corp. (Wallace Division) as discriminatory and unreasonable, the Idaho Public Utilities Commission has ordered them reduced. All residential rates were reduced to an 8-c. level for the first 30 kw.-hr.; formerly they had been as high as 12c. The residential heating-lighting-refrigeration rate has been set at 3c. for the first 200 kw.-hr. The new commercial rates were fixed at 8c. for the first 50 kw.-hr., and the commercial combination rate at 3c. for the first 500 kw.-hr. The Public Utilities Consolidated Corp. (Wallace Division) serves Burke, Mullan and Wallace, Idaho.

PUYALLUP MAY VOTE AGAIN ON ACQUIRING POWER CO. PROPERTIES—A petition has been circulated in the city of Puyallup, Wash., asking the council to withhold further action in the matter of the city taking over the properties of the Puget Sound Power & Light Co., until the qualified voters shall have again voted on the measure. What action the mayor and council will take is problematical. The mayor and all members of the council gave pre-election pledges and have since publicly stated that they are in thorough accord with the mandate of the people at the election of March, 1929.

P. C. E. A.

Ad-Publicity Men Discuss Three Timely Subjects

House organs, newspaper controversies, and advertising rates were subjects of spirited discussion at the first meeting this year of the Advertising-Publicity Section, held at the Sir Francis Drake Hotel, San Francisco, Oct. 30. E. P. Ramsay, Los Angeles Gas and Electric Corp., chairman, presided over the morning and afternoon sessions.

The morning session was devoted to business affairs of the Section. A new committee, consisting of J. Charles Jordan, P. G. and E. Co.; K. I. Dazey, P. C. E. A.; and W. A. Cyr, ELECTRICAL WEST, was appointed to revise the Section's "Book of Standards." The exchange of advertising tear sheets among members is to be continued as in the past with Forrest M. Raymond, San Diego Consolidated Gas & Electric Co., acting as a clearing house.

Rules and conditions for the national employees' speaking contest to be conducted this year under the auspices of the Public Relations Section, but with R. E. Smith, Southern California Edison Co. Ltd., member of the Advertising-Publicity Section, as chairman of the committee, were discussed. There is a choice of two subjects this year, "Relation of Government and Business" and "The Electrical Industry as an Economic and Social Factor in America." The time allotted is between 7 and 15 min. Matters of prizes and other details were settled and will be announced.

After a luncheon the Section reconvened for a round-table discussion of three study topics.

The first was "Of What Value Are Public Utility House Organs?" and was led by F. M. Raymond. The consensus of opinion proved to be that public utility house organs are more essential during periods of depression than at any other time in maintaining employee morale and should be added to rather than curtailed during such periods. Various angles of treatment and various types of house organs were discussed at length.

A second topic, led by J. Charles Jordan, was "Should Newspaper Attacks be Answered or Ignored?" The helpless position of utilities in such controversies was brought out. That "fire prevention is better than a fire department" was conceded. Misstatements of facts by public officials, organizations or newspapers, it was agreed, should be corrected. As a general principle, attacks on utilities are made upon an emotional rather than an intelligent basis—a fact which must be recognized and coped with.

Another lively topic, led by R. E. Smith, was that of the unequal advertising rates charged utilities for their advertising space. Discussions brought out that individual negotiations could best bring about adjustment of such matters.

The Advertising-Publicity Section this year, according to its chairman, E. P. Ramsay, will hold its gatherings distinct and separate from those of the Commercial Section with which it has held joint meetings in the past two years. Joint meetings may be held, however, with the similar section of the Pacific Coast Gas Assn. at some future time.

Financial

Calif.-Ore. Co. Common Stock Issue Is Vetoed

Holding that a new issue of common stock, requested by The California Oregon Power Co., would serve automatically to transfer the control of that company from preferred stock owners in whom control now rests, and whose holdings represent the largest investment in the company, to owners of common stock, the Railroad Commission has refused to give its approval to an issue of new common stock as requested by the directors of the company acting under an amendment to the Articles of Incorporation approved by the stockholders.

The application asked permission to issue 59,411 shares of common stock without par value, in exchange for the outstanding 59,411 shares of common stock having a par value of $100 each. In addition, it would issue 36,240 shares of common stock having no par value, at $25 per share, or for a total consideration of $906,000.

Other phases of the application, however, received the approval of the Railroad Commission. These were:

(1) Authorization to issue $4,000,000 of present refunding mortgage bonds of The California Oregon Power Co. 5 per cent series due 1961, to be deposited as collateral security for the payment of $3,500,000 of one year 4½-per cent notes, the issue of which is also authorized.

(2) The sale of $3,000,000 of 5½ per cent gold debentures, Series A.

(3) The sale of 5,000 shares of the company's 6 per cent preferred stock, Series of 1927, to net the company not less than $94 per share.

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California Utilities Offer Good Income Yield

Four leading California utilities are yielding from 4.43 to 6.05 per cent on their bonds and preferred stock, it is disclosed in a recent survey made by a California investment house. The demand for these securities is attracting considerable attention from the Eastern as well as the Western investor. Electric utilities analyzed in this report follow:

	Avg. Bond Yield	Avg. Pfd. Stock Yield
Pacific Gas and Electric Co.	4.43	5.05
Southern Cal. Edison Co. Ltd.	4.43	5.32
Los Angeles Gas and Elec. Corp.	4.55	5.45
San Diego Cons. Gas & Elec. Co.	4.87	6.05

Indicative of this stability is the report on power sales for California for 1930 totaling $132,418,375.84 as compared with $128,464,236.74 for 1929 and $117,759,296.37 for 1928. These totals compare with $64,422,114.87 in 1921. Various economies, moreover, have strengthened the positions of the companies behind the securities.

Deficit in Tacoma Light Department's Funds

That it will be necessary for the Tacoma light department to refund a $500,000 loan negotiated with local banks earlier in the year, in order to allow the department to keep on a cash basis, developed at a recent meeting of the city council called to consider a financial statement of the department prepared by Controller Thomas A. Swayze.

There was a net deficit in the light department's funds of all kinds on Sept. 30 last of $312,515.17, the report showed, and Mr. Swayze estimated that this deficit will increase to $473,486.49 by the end of the year. The light department's cash reserve fund has been depleted by heavy drafts on it for construction costs of the second Cushman power project unit, it was stated. The controller declared his belief that the light department will be able to clear up the situation and take care of all bond interest and retirement, which will be heavy next year.

The light department borrowed $500,000 on notes last spring and has paid back all but $150,000 of this amount, the statement showed. The rest falls due before the end of the year. The light department, Commissioner C. V. Fawcett, city treasurer, points out, has assets of more than $18,000,000, and is bonded for about half this amount, hence is fully solvent. The controller listed $1,019,274.86 in needs of the light department to keep it on a cash basis for the remainder of the year, of which he estimated $545,788.37 will be furnished by earnings.

An ordinance appropriating $50,000 for repairs to the steam plant condenser intake of the city light plant has been withdrawn upon finding that there are no funds in the bond issue fund with which to pay for repairs. A new ordinance for $60,000, providing for an appropriation from the light and power fund, payable out of the earnings of the light department, has been preprepared. Commissioner Ira S. Davisson states the sum has been raised $10,000 to insure sufficient funds for the work.

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Income Statements Show Pacific Coast Companies With Slight Loss

DECREASE in gross earnings is shown by some utility companies operating on the Pacific Coast in recent yearly financial statements. This is offset in one or two instances by a decrease in operating and maintenance expense, resulting in a gain in net income for the year.

California-Oregon Power Co. and San Diego Consolidated Gas & Electric Co. made gains in gross and net earnings for the year ended Aug. 31, 1931, over the year previous. The two other companies in the Standard Gas & Electric Co. controlled group operating in the Western States showed a loss in both gross and net for the year.

Puget Sound Power & Light Co., with a loss in gross earnings, brought its net earnings above those for the year previous. Gross and net revenues of the Portland General Electric Co. are shown to be larger than in corresponding months of 1930 in the company's third quarter report. Net for the period was $1,055,565 compared with $1,002,818 for the September quarter last year. Southern California Edison Co. was well ahead in gross and net earnings for the first half of 1931.

Notwithstanding the general depression in business throughout Canada, earnings of the B. C. Electric Railway Co. in both its electric and gas departments have recorded increases. This is in face of the fact that during the financial year 1930 expenses of operation by the company were substantially increased as a result of the serious water shortage.

Marked gains for the fiscal year 1930-31 are shown by the financial statements of the Los Angeles Department of Water and Power and the Pasadena (Calif.) Municipal Light and Power Department. Profits of $4,344,289.79 were earned by the Los Angeles power system, showing an increase of $120,000 over the previous year. Revenues for 1930-31 totaled $15,380,053, and the net income before deductions for interest and depreciation charges was $7,911,684.22, the report shows. Pasadena's income for 1930-31 from the sale of electrical energy amounted to $1,528,892 as compared with $1,463,653.37 for the preceding year.

A comparison of earnings of companies whose yearly income statements have been received during the last quarter follows:

Company	— Gross Earnings — 1931	1930	— Net Earnings — 1931	1930
The California Oregon Power Co.	$3,921,935	$3,798,565	$1,855,477	$2,211,382
Mountain States Power Co.	3,457,654	3,478,168	1,212,417	1,277,889
San Diego Cons. Gas & Electric Co.	7,420,406	7,308,682	3,773,443	3,600,029
Southern Colorado Power Co.	2,153,840	2,999,503	1,018,630	1,075,611
Pacific Gas and Electric Co.	66,461,931	65,438,930	38,162,514	37,093,515
Arizona Edison Co.	1,827,306	1,882,607	672,944	799,633
Nevada California Electric Corp.	5,760,317	5,638,721	3,004,392	2,902,023
Puget Sound Power & Light Co.	16,204,737	17,109,695	8,331,076	8,197,817
Los Angeles Gas and Electric Corp.	23,658,917	23,568,541	10,807,346	10,568,529
Southern California Edison Co. Ltd. (eight months ended Aug. 31)	27,093,401	27,031,749	17,762,402	17,876,420

GREAT WESTERN STOCK TRANSFER DATE EXTENDED—The California Railroad Commission has extended from Sept. 30, 1931, to Dec. 31, 1931, the time in which the Pacific Gas and Electric Co. is permitted to exchange its 5½ and 6 per cent preferred stock for preferred stock of the Great Western Power Co. of California and Feather River Power Co. under previously announced terms. (See ELECTRICAL WEST, Nov. 1, 1930, p. 263.)

P. G. and E. Co. MAY INCREASE BONDED INDEBTEDNESS—Permission has been granted by the California Railroad Commission to the Pacific Gas and Electric Co. and the Mt. Shasta Power Corp., its subsidiary, to increase its bonded indebtedness from $250,000,000 to $500,000,000 and to execute a supplemental indenture to this extent. In authorizing the increase, the Commission stated that the Pacific Gas and Electric Co. "does not at this time ask permission to issue any bonds. The indenture makes no changes in the company's first and refunding mortgage or deed of trust supplemental indenture, except increasing the amount of bonds which may be issued under such instrument."

THE CALIFORNIA RAILROAD COMMISSION has extended until Dec. 31, 1931, the time in which Southern California Edison Co. Ltd. may issue and sell $6,600,000 face value of its refunding mortgage gold bonds, Series of 4½'s, due 1955. The bonds were authorized by the Commission on Sept. 21, 1931.

NET EARNINGS of Electrical Products Corp. of Washington for the nine months ended Sept. 30 last totaled $71,189.89 compared with $86,611.09 for the same period of 1930.

REFINANCING PERMIT GRANTED SAN DIEGO CO.—The San Diego Consolidated Gas & Electric Co. has been authorized by the California Railroad Commission to issue and sell on or before Dec. 15, 1931, a total of $1,500,000 in unsecured notes. The notes are to be dated Dec. 1, 1931, are to mature in a year from that date, and to bear interest at 4½ per cent. The proceeds from the issue are to be used to pay a note issue of $1,500,000 due Dec. 1, 1931. The order provides that the notes shall be sold at not less than 98½ per cent of their face value and accrued interest.

THE METROPOLITAN WATER DISTRICT of Southern California has begun negotiations with the Los Angeles Clearinghouse Association to determine if it can borrow $260,000 with which to increase its program of preliminary work on the proposed Colorado River aqueduct. Until bonds from the $220-million issue voted in September can be validated, the district has only the proceeds from a 3-c. tax levy to finance its activity.

News Shorts

¶ PUGET SOUND POWER & LIGHT CO.'s application for a franchise to sell power in Tacoma, Wash., has been rejected by the city council, but the council will discuss the form of a new franchise satisfactory to all parties.

¶ "POWEROLOGY" is the new name of Puget Sound Power & Light Co.'s house organ. Formerly *Puget Sound Electric Journal*, the new-title magazine made its first appearance in September.

¶ BELEN, N. M., will investigate the possibility of municipal ownership of the local power and light plant as a means to reduce power and light rates. Press dispatches give domestic rate as 18c. per kw.-hr. Belen is served by the New Mexico Power Co., Federal Light & Traction Co. subsidiary.

¶ CITY OF TACOMA is being sued for $236,436 in damages by L. H. Hoffman, Portland contractor, who built Cushman power unit No. 2, in the Federal District Court. Mr. Hoffman declares Ira S. Davisson, commissioner of public utilities, and the late J. L. Stannard, then Mr. Davisson's chief engineer, approved of construction methods and orally agreed to several stipulations which they violated during and after the work on the power project.

¶ SAN DIEGO CONSOLIDATED GAS & ELECTRIC CO. has been granted by the California Railroad Commission a certificate of public convenience and necessity to exercise service privileges for gas and electricity granted it by ordinances in the cities of San Diego, Coronado, El Cajon, Chula Vista and National City in San Diego County and by ordinance of the Board of Supervisors of Orange County.

¶ CENTRAL MENDOCINO COUNTY (CALIF.) POWER CO. has applied to the Railroad Commission to approve extension of service from Willits to Laytonville, both in Mendocino County.

¶ WEST CANADIAN HYDRO-ELECTRIC CO. soon will occupy its new $14,000 store and general office building at Vernon, B. C. The company intends to establish branch stores and offices in leading cities throughout the Okanagan Valley, which it serves.

¶ VANCOUVER ISLAND POWER CO. has been granted one year's time extension to commence power developments at Campbell River on Vancouver Island, B. C.

¶ EQUITABLE SECURITIES CO., San Francisco, has notified Oregon's Hydro-Electric Commission that power applications filed by the company affecting Zig Zag and Salmon Rivers are withdrawn. The company has been seeking to increase Salmon River flow by diverting Zig Zag River into it.

¶ MAYOR R. M. ROBERTS of Cranbrook, B. C., recently visited Vancouver, inquired as to purchase of plant and equipment for electrical generating units for his city. Cranbrook owns its own distribution system, but the electrical contract between it and the East Kootenay Power Co. will expire next year.

¶ CENTRALIA, WASH., is spending $10,000 in repairs to its Nisqually River hydro power plant, near Yelm. High water loosened logs in the dam last winter. During eleven months to date, current consumption from the plant has been 4,175,735 kw., a 772,735-kw. increase.

¶ STREET LIGHTS, costing $20,000, will be placed on Fairview Ave., Seattle, from Denny Way to Republican St.

¶ SEATTLE'S city engineering department, not City Light, will supervise machinery installation at Diablo power plant, Corporation Counsel A. C. Van Soelen ruled, because contracts were let prior to passing of an ordinance giving the latter jurisdiction over its own engineering work.

¶ PUGET SOUND POWER & LIGHT CO. has completed its $900,000 power transmission line from Rock Island power development to Skykomish. (See p. 292, this issue).

¶ OKANOGAN VALLEY (WASH.) POWER & LIGHT CO. has been incorporated for $150,000 by R. P. Hodykn & Associates, and plans the construction of a 6,500-hp. plant on the Similkameen River as soon as conditions are favorable.

¶ PUGET SOUND POWER & LIGHT CO. will immediately spend $11,000 in constructing 10.5 mi. of transmission lines in Thurston County (Wash.) providing power and light to 85 families. Work has also started on a 3-mi. project between Oakville and Elma.

¶ PRELIMINARY PERMIT application, providing for 350,000-hp. projects on Columbia River in Washington and Oregon, has been submitted to Federal Power Commission by a New York group, headed by Charles O. Lentz. Plans call for a power plant at Cascade Rock in Skamania County, Wash., and Hood River County, Ore. Projects consist of a diversion dam, forebay, power house and tailrace adjacent to present navigation canal.

CALIFORNIA RAILROAD COMMISSION has approved an agreement between Pacific Gas and Electric Co. and Hercules Powder Co., providing for the sale of power to the powder company at 3 mills per kw.-hr. The latter agreed that it will, upon proper request, discontinue taking power for a consecutive period not exceeding three months in any one year and will, when required, operate its steam-electric generating plant, delivering the surplus to the power company at cost.

Meetings

Coming Events

Arizona Utilities Association — Annual convention at Tucson, Ariz., April 13-15, 1932.

International Association of Electrical Inspectors, Northwest Section— Seventh annual convention at Wenatchee, Wash., Sept. 6-8, 1932 (tentative).

Southwest Section — Convention at Santa Barbara, Calif., Sept. 12-14, 1932.

National Electric Light Association— Annual convention and exhibit, Atlantic City, N. J., June 6-10, 1932.

National Electrical Wholesalers Association, Pacific Division—Thrice yearly meeting, Hotel Del Monte, Del Monte, Calif., Feb. 4-6, 1932.

Pacific Coast Electrical Assn.— Commercial Section meeting, San Francisco, Dec. 10-11, 1931.
Engineering Section meeting, Los Angeles, Dec. 9-11, 1931.
Purchasing and Stores Section meeting, Los Angeles, Dec. 10-11, 1931.

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B. C. POWER CORP. OFFICERS RE-ELECTED—The retiring officers and board of directors of British Columbia Power Corp., Ltd., were re-elected at the third annual general meeting of shareholders, held in the B. C. Electric Bldg., Vancouver, Oct. 5. At a subsequent meeting of the board the following officers were elected: president, W. G. Murrin; vice-presidents, A. T. Goward, E. H. Adams, J. I. Newell; treasurer, E. H. Adams; secretary, E. Rogers.

THE ELECTRIC CLUB OF SEATTLE has elected the following officers to serve during 1932: president, W. A. Thies, The Pacific Telephone & Telegraph Co.; vice-presidents: Herbert Boring, General Electric Co.; George Miles, Westinghouse Electric & Manufacturing Co.; Glen Smith, Seattle Municipal Light Department; Reno Thatcher, Puget Sound Power & Light Co.; treasurer: Norman L. Bost, National Electric Products Corp.; secretary: Charley Allison, Puget Sound Power & Light Co. The following trustees were also elected: Sam Hepler, Arrow Electric Co.; J. D. Sparks, Bryant Electric Co.; Charles Cutter, Pacific Electric Manufacturing Corp.

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Rural Electric Short Course December Program

Soil heating, agricultural rates, ultra-violet light in poultry raising and the use of lights for insect control are among the timely subjects which will feature a short course in rural electrication to be conducted at the University of California, college of agriculture, Davis, Dec. 14-17. The course is being held under the auspices of the California Committee on the Relation of Electricity to Agriculture.

Manufacturers also will find much of interest in the program. Producers of heating elements, refrigeration manufacturers, lighting men and farm appliance manufacturers are invited by the agricultural engineering division of the college to attend either the entire course or any specific lecture of interest to them.

The program follows:

MONDAY, DEC. 14

9.00 a.m. Registration
10.30 a.m. Assembly
11:00 a.m. Address by H. B. Walker
12:00 noon Luncheon
1:30 p.m. "Soil Heating Mechanics" by J. R. Tavernetti
Demonstration of Feed Grinders and Automatic Equipment for Feed Grinders, by J. R. Tavernetti
4:00 p.m. Trip around the farm or visits to special laboratories
6:30 p.m. Annual supper. Dr. W. L. Howard, speaker

TUESDAY, DEC. 15

8:00 a.m. "Irrigation Costs," by J. B. Brown
9.00 a.m. "The Electric Steam Boiler," by O. C. French
10:15 a.m. "Underground Water Resources," by Harold Conkling
11:15 a.m. "The Electric Heating Element," by B. D. Moses
12:00 noon Luncheon
1:00 p.m. "California Agricultural Electric Rates," by L. S. Wing
2:00 p.m. "The Mechanics of the Milking Machine," by R. L. Perry
3:15 p.m. Detailed Study and Discussion of Milking Machines by the group, led by R. L. Perry

WEDNESDAY, DEC. 16

8:00 a.m. "The Use of Ultra Violet Light in Poultry Raising," by J. E. Dougherty
9:00 a.m. "Hay Chopping," by B. D. Moses
10:15 a.m. "Winter Irrigation," by F. J. Veihmeyer
11:15 a.m. "Refrigeration on the Farm," by A. F. Kessing
1:00 p.m. "The Use of Lights for Insect Control," by W. B. Herms
2:00 p.m. "Motor Troubles, Trouble Shooting," by W. J. Delehanty
3:15 p.m. Demonstrations and Discussion, Motor Troubles and Trouble Shooting. W. J. Delehanty and B. D. Moses

THURSDAY, DEC. 17

8:00 a.m. "Application of the Electric Brooder to the Raising of Turkeys and Other Fowls Than Chickens," by W. E. Lloyd
9:00 a.m. Round Table Discussion on Electric Brooding, led by Charles Sublette
10.20 a.m. "The Use of the Stationary Spray Plant in the Northwest," by W. P. Duruz

Revival of Leagues Seen In San Jose Meeting

Revival of the electrical leagues which were numerous some years ago throughout California was started in San Jose Nov. 12 when Frank Kiefer, northern regional manager for the Pacific Coast Electrical Bureau, called together representatives of all branches of the industry in that locality for the formation of an electrical development league. There were 28 present, representing all branches of the industry, at this organization meeting.

Several short addresses preceded the actual organization of a new league. K. I. Dazey, managing director, P.C.E.B., outlined the organization of the bureau with its representation of all branches of the industry. He was followed by Victor Hartley, assistant managing director, who spoke in some detail of the operations of the bureau under its committee organization.

Mr. Hartley reviewed the work of the bureau during the past year in matters of uniform ordinances, Red Seal specifications, various lighting displays and advertising mailings, appliance merchandising sales courses, industrial electrification, visits to model plants, agricultural electrification, farm wiring standards, and the cooperative advertising of the bureau in magazines of local distribution.

Edward Martin, president, California Electragists, Northern Chapter, outlined as a possible activity for the new league the formation of a separate section of contractors and the operation of the certified contractor plan which had won the McGraw Award for the contracting industry during the past year. He was followed by W. A. Cyr, ELECTRICAL WEST, who spoke of the specific needs for a league in Santa Clara County.

Roy Butcher, San Jose electragist, was elected president of the new organization, and William Bowler, Pacific Gas and Electric Co., was named secretary-treasurer of the organization.

Organization details were completed at a second meeting held Nov. 19. Tentatively meetings are to be held on Thursday nights twice monthly at 6:30 p.m. in the Hotel de Anza.

After the Nov. 12 meeting had adjourned, contractors present remained for a special meeting with Edward Martin. In this meeting it was urged that the contractors form a branch of the Electragists or at least form a special section of the league for the handling of contractor problems. At this meeting Sam Pierce, Garden City Electric Co., San Jose, was named chairman of the contractor section, and William Harvey, of Guilbert Brothers Electric Co., San Jose, was named secretary. Serious contemplation of the certified contractor plan is to be made with a view to adaptation of it to the local community.

Personals

Ralph Leavenworth Made Westinghouse Ad Manager

RALPH LEAVENWORTH has been appointed general advertising manager of the Westinghouse Electric & Manufacturing Co., according to an announcement made by J. S. Tritle, vice-president and general manager. He will have charge of all advertising and publicity activities of the company, including the advertising division of the merchandising department, now centered in Mansfield, Ohio.

The business career of Mr. Leavenworth, prior to his association with the Westinghouse company, has been one in which sales and advertising administrative work have been closely paralleled.

Graduating from Hamilton College, Clinton, N. Y., in 1914, he became associated with the Y.M.C.A., with headquarters in Cleveland and remained with that organization four years. After the war he joined the Standard Parts Co., of Cleveland, and was advertising manager of this concern until 1923. In that year he became an account executive for Paul Teas, Inc., an industrial advertising agency. He remained with this firm six years becoming in that time part owner of the company. On Jan. 1, 1930, Mr. Leavenworth joined the Austin Co. of Cleveland, as assistant general sales manager, serving in an executive capacity on sales, administrative and advertising work. His appointment as general advertising manager of the Westinghouse company followed. He will have his office in the East Pittsburgh headquarters of the company.

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JAMES R. KEARNEY, president, The James R. Kearney Corp., St. Louis, Mo., accompanied by A. Bishop Chance, was a California visitor in November. Messrs. Kearney and Chance spent some time in San Francisco conferring with Maydwell & Hartzell, Inc., representatives of Kearney products in this territory, before leaving Nov. 20 for a visit in Los Angeles.

GEORGE BAUDER, president of the George T. Bauder Co., San Diego General Electric refrigerator agency, recently returned from an airplane trip through Russia. He addressed the San Diego Electric Club on conditions in that country on Oct. 27.

E. B. CRIDDLE, vice-president and general agent of The Southern Sierras Power Co., Riverside, Calif., has resumed his duties with the company after five months' leave necessitated by severe eye strain.

W. N. CLARK

E. F. STONE

Colorado Power Company Promotions Announced

W. N. CLARK has been elected president of Southern Colorado Power Co., according to an announcement by John J. O'Brien, president, Standard Gas and Electric Company. Mr. Clark has been vice-president and general manager of the Southern Colorado company since 1924; the office of president has been held by Mr. O'Brien, who as president of Byllesby Engineering and Management Corp. and Standard Gas and Electric Co. has served also as president of most of the subsidiary and affiliated companies comprising the Standard Gas and Electric Co. system.

Announcement also is made of the election of E. F. Stone as vice-president in charge of sales; M. G. Lord, vice-president in charge of operation, and W. J. Benning, vice-president and treasurer.

Mr. Clark graduated from the University of Illinois and from the Colorado School of Mines with a degree of electrical engineer. After working a short time with the telephone company and the old Denver Gas and Electric Co., he entered the mining districts of Colorado and participated in the earliest development of three-phase transmission of power from hydroelectric plants for mining service in the San Juan district. From there he entered the Cripple Creek district, installing an underground mine trolley haulage system at the Gold Coin mine and the interurban railway in that district, together with electrification of the gold mines including mine pumping at great depths. Mr. Clark was instrumental in consolidating the four leading electric companies in the Cripple Creek mining district into one organization. He joined the Byllesby organization in 1911 when a number of the operating companies were purchased in southern Colorado.

Messrs. Stone, Lord and Benning, newly elected vice-presidents, have all been connected with the Southern Colorado Power Co. for many years. Mr. Stone was formerly assistant general manager of the company and in that position was in charge of power transmission, city distribution, commercial sales and public relations. He is a native of Virginia and received his early education in that state. As an engineer with the Norfolk & Portsmouth Lighting & Traction Co. of Norfolk, Va., he designed and constructed all of the electric service requirements for the Jamestown Exposition. In 1925 he was elected president of the Colorado Public Service Assn.

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ARTHUR P. DAVIS, former director of the Bureau of Reclamation, has been appointed to succeed the late A. J. Wiley as a member of the engineering board of review of the Metropolitan Water District of Southern California. The district's board of directors also announced the selection of Harvey S. Mudd, mining engineer, and Royal W. Sorensen, professor of electrical engineering at California Institute of Technology, to augment its engineering board of review. Mr. Mudd and Prof. Sorenson are residents of Pasadena and Los Angeles, respectively. Mr. Davis, whose home is at Oakland, Calif., recently returned to the United States from Russia where he had been engaged by the government to design a reclamation project. Other members of the board of review are Thaddeus Merriman and Richard R. Lyman.

RALPH B. WILLIAMSON, vice-chairman of the Federal Power Commission, was a vistor to the Pacific Northwest recently. Accompanied by Glenn L. Parker, in charge of the Tacoma office of the U.S. Geological Survey, and R. K. Tiffany, consulting engineer for the City of Tacoma on the Cushman power development, Mr. Williamson inspected the Cushman project and other phases of Tacoma's municipal power plant. He then visited the Diablo Dam of the Skagit River power project of the City of Seattle, and the Rock Island development under way by the Puget Sound Power & Light Co.

H. A. BARRE, chief engineer of the Southern California Edison Co. Ltd., and E. R. Davis have been appointed to serve on the company's recently created engineering executive committee.

B. S. ROBINSON, sales engineer for the Triplex Products Corp., Clifton, N. J., is on an extended visit to the Pacific Coast.

W. A. THIES

GARDNER BUSS

Telephone Co. Engineer Seattle Club President

W. A. THIES, newly elected president of the Electric Club of Seattle, has been an employee of The Pacific Telephone & Telegraph Co. continuously since his graduation from the University of Washington in 1921. He is a civil engineer and for seven years was engaged in the design and supervision of engineering projects for the telephone company; since 1928 he has been associated with the development of "improving telephone facilities in new buildings" and its allied sales work. Mr. Thies succeeds J. J. Hayes, of the Westinghouse Electric & Mfg. Co., as president of the Seattle Electric Club.

During the World War Mr. Thies was a second lieutenant in the field artillery and is a graduate of the School of Fire at Fort Sill, Oklahoma. He did not see active service overseas, being retained as an instructor in various training areas. He has the reputation of a "goer and doer" and the Electric Club is expected to forge ahead under his capable guidance.

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VALENTINE TUCKER, chief engineer and general manager of the Hankow (China) Light and Power Company, Ltd., has been a recent visitor in California. Mr. Tucker has been in England on a combined business and pleasure trip, and spent some time in Pasadena before returning by way of San Francisco to the Orient.

GUS W. FORSBERG, manager of the Wasatch Electric Co., Salt Lake City, left for Sweden during the latter part of November. He has accepted the presidency of the Swedish mission for the Church of Jesus Christ of Latter Day Saints, and will remain in Sweden for several years.

CHARLES H. CUTTER, manager of the Seattle office of the Pacific Electric Mfg. Corp.,has been appointed business manager for "R.P.M.," the monthly paper published by the Electric Club of Seattle. He succeeds Harry J. Martin, of the National Carbon Co., who held this gratuitous position for over eight years.

H. J. GILLE, manager of the agricultural and industrial department of the Puget Sound Power & Light Co., Seattle, addressed the recent gathering of Western governors at Portland on "Back to the Land."

HENRY L. STEVENS, consulting engineer for the Hoosier Engineering Co., in Seattle, recently moved his offices from the Smith Tower to the Thompson Bldg., Fourth Ave. and Cherry St.

MISS BERTHA DALE, assistant manager, personnel department, Pacific Gas and Electric Co., and chairman of the company's women's committee, returned overland to San Francisco last month from a trip through the Panama Canal to New York.

PAUL M. DOWNING, vice-president and general manager of the Pacific Gas and Electric Co., was a guest at the White House Nov. 12 when a reunion of the Stanford University football team of 1894 was held there with President Hoover, the team's financial manager, as host. Mr. Downing was captain of the team.

W. R. PHIBBS, general manager of the Utah branch of the Columbia Steel Co., was elected a director of the Utah Power & Light Co. at the annual stockholders' meeting held recently in Augusta, Maine.

W. D. KANN, formerly associated with the Gardner Electrical Mfg. Co., makers of transformers, Oakland, Calif., and recently connected with the Enterprise Electric Works in charge of the transformer department, has been named president of the company, it was announced recently.

E. W. HAMMOND, formerly with the Worthington Pump and Machinery Corp. in Buffalo, N. Y., has been transferred to Los Angeles as special representative of Worthington diesel and gas engine sales on the Pacific Coast.

GEORGE MATTHEWS has just been appointed assistant city electrical inspector of Kelowna, B. C. Mr. Matthews is well known in the electrical industry of that region.

Gardner Buss Heads Oakland Electric Club

GARDNER BUSS, of the Oakland sales department of Pacific Gas and Electric Co., is the new president of the Oakland Electric Club. Mr. Buss, who has been with the P. G. and E. Co. in its East Bay Division for the past ten years, has been an active member of the electric club during practically this entire period.

For many years he was employed as a salesman by the National Cash Register Co. and brought to the electrical industry a wealth of sales experience that has made him an outstanding member of the P. G. and E. East Bay organization.

At the election of the club held last month, Homer G. Keesling, assistant division superintendent of the P. G. and E., was made vice-president and Herluf A. Knudsen, electrical and mechanical engineer with the East Bay Municipal Utility District, was chosen as secretary-treasurer. The membership of the board of directors is as follows: Ben C. Hill, supervising electrical inspector, City of Oakland; Sam G. Gearhart, Jr., electrical engineer, General Electric Co.; Lew F. Galbraith, division sales manager, P. G. and E. Co.; Arthur P. Peck, manager, Westinghouse Electric Supply Co.; T. L. Rosenberg, president, T. L. Rosenberg Co., electrical contractors.

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E. R. BARTLETT, vice-president of the Hooker Electrochemical Co., in charge of operations at both the Niagara and the Tacoma plants, recently spent ten days in Tacoma inspecting the company's properties on the Hylebos waterway.

COLONEL S. P. MCFADDEN, vice-president of the Puget Sound Power & Light Co., has charge of volunteer forces in the Red Cross campaign to raise Seattle's $75,000 quota.

Obituary

W. J. ASCHENBRENNER, sales manager for Thompson & Holmes, Ltd., San Francisco distributor of refrigerators and radios, died at the Mills Memorial Hospital, San Mateo, Calif., on Oct. 29. In running for his morning train at Burlingame, Mr. Aschenbrenner leaped for the step, caught it, and then fell beneath the wheels of the train, receiving injuries so serious that he died later at the hospital. Prior to his becoming associated with Thompson & Holmes, he was secretary-manager of the Pacific Radio Trades Assn.

LEWIS TAYLOR ROBINSON, engineer in charge of the general engineering laboratory of the General Electric Co., died suddenly from a heart attack at his home in Schenectady, Nov. 3. Dr. Robinson was a veteran electrical technician and one of the widest known electric engineers in the profession.

Contractor Dealer Inspector

Upholds Portland Ban on Non-Approved Appliances

When a Portland department store was refused permission to market 600 non-approved radio receivers because such sale violated a city electrical ordinance requiring that all appliances or equipment offered for sale have the approval of the Underwriters' Laboratories, the store requested a hearing before a board of appeal. This latter body upheld the ordinance in every respect, ordering the store not to sell the sets. The ruling negatived the store's claim that the expense of Laboratory approval on the merchandise in question was unwarranted since the model was no longer in production and that test and approval by a local inspection department should be sufficient in case of radio equipment.

Representatives of the city inspection department, the Oregon Insurance Rating Bureau, and attorneys for the store and for the Radio Trades Assn. attended the hearing. Testimony revealed that there was official record of 90 fires developing in radio sets in Portland, chiefly in non-approved models, but that the sets in question were not in inventory at the time the ordinance was passed. The store has not taken the case to court.

The position of the Radio Assn. at the hearing indicated that radio dealers generally are for strict enforcement as a means of preventing dumping of inferior or "orphaned" goods at prices which disturb the market.

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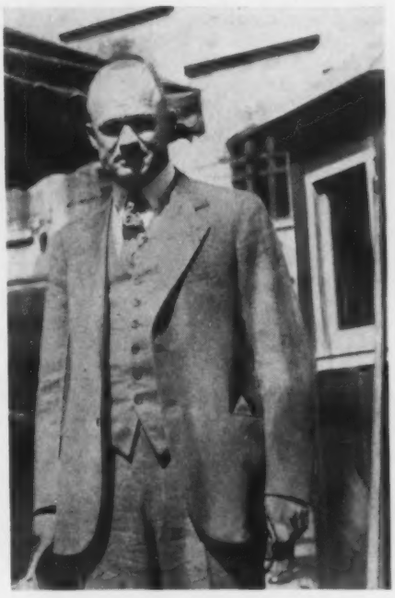
ILLUMINATION, LTD., lighting specialists, has moved its headquarters in Oakland, Calif., to 323 Fourteenth St.

S. A. RAN CO., INC., lighting fixture dealers in Oakland and San Francisco, Calif., has announced the opening of a new store at 828 Webster St., Oakland. The former building at this location was destroyed by fire. Maurice Taloff is manager.

ELECTRIC EQUIPMENT CO., 156 West Center St., Provo, Utah, has just entered the field of electrical merchandising, contracting and equipment. Waldo E. Smith, manager of the new company, has been a resident of Provo for the past 25 years. He was associated with the Mountain States Telephone Co. as assistant chief engineer for a number of years, and later was in the employ of the Utah Power & Light Co. The new store is designed especially for the electrical merchandising business, and is equipped with compartments for the demonstration of various appliances. A full line of appliances and fixtures will be handled.

Coast Committeeman



Frank Sievers, of Kuchel-Sievers Electric Works, San Francisco, has been appointed Pacific Coast representative on the executive committee of the Association of Electragists International. His selection follows the resignation of Clyde Chamblin

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San Francisco Wage Board Recommends 5-Day Week

The present daily wage scales in the building industry in San Francisco and Alameda Counties will be maintained during 1932, according to the report of the Impartial Wage Board, appointed by the Industrial Associations of the East Bay and San Francisco to survey conditions in the building trades and recommend wage scales in the San Francisco Bay area for 1932. The findings of the board are as follows:

(1) Present wage scale to remain in effect during 1932.
(2) Official working week of five days.
(3) Working day to remain at eight hours.
(4) Overtime to be paid at the rate of time and one-half.
(5) Work on Saturdays, Sundays and holidays to be paid at double rate.
(6) Actual emergency and repair work to be registered and may be performed outside regular working hours in eight-hour shifts.
(7) Employment of improvers or helpers, except by official designation, constitutes violation of the award.
(8) Ratios of journemen and apprentices to be worked out cooperatively by employers, union representatives and the Industrial Association.

The board recommended steps be taken for adoption of an official six-hour day and urged an orderly effort be made to reduce building costs in the interests of the community.

The present wage being paid the electrical workers is $9 a day, and electrical fixture hangers are receiving $8 per day.

Holiday Refrigeration Display Contest

Six prizes, totaling $600, are being offered by the Electric Refrigeration Bureau for the best holiday window and store interior displays, and any utility or other retail sales outlet for Frigidaire, General Electric, Kelvinator, Norge, or Westinghouse electric refrigerators is eligible to compete.

In order that the small retail outlet may have as good a chance to win as his larger competitors, three classifications of displays have been set up:

For stores with 20-ft. frontage or less—
Award for best window, $100
Award for best interior display, $100

For stores with 21- to 40-ft. frontage—
Award for best window, $100
Award for best interior display, $100

For stores with over 40-ft. frontage—
Award for best window, $100
Award for best interior display, $100

Any eligible competitor may compete for one or both of the prizes in his class. The competing displays must stress in some way or other the Christmas spirit and the idea that an electric refrigerator is an appropriate Christmas gift. They must be displays in actual use in 1931, and a photograph and descriptive letter must be sent in to N.E.L.A. headquarters not later than Jan. 5, 1932.

For window displays, the following points will be considered:

1. Christmas sales appeal
2. Effective use of manufacturer's display material
3. Use of Electric Refrigeration Bureau tie-ups, such as cut-outs, window stickers, or Christmas magazine advertisement proofs
4. Attractive appearance and arrangement
5. Individuality or unique features
6. Lighting effects and after-dark display

For interior displays the same points will be considered, except that point No. 6 will be "Accessibility."

The terms of the contest are set forth in a folder being distributed by the National Electric Light Assn., sponsors of the Bureau, 420 Lexington Ave., New York.

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San Diego Reduces Contractor Fees

San Diego's (Calif.) city council has passed an ordinance reducing contractor's license fees from $100 to $10 and master electricians' fees from $25 to $10. A petition from the contractors asked that license fees be abolished. The ordinance is expected to afford contractors some relief from the dearth of business.

A. E. Johnstone, city electrician, is quoted as saying, "There is also a movement on foot requesting that the permit fees be reduced. We have a committee working on this and I hope to adopt the uniform ordinance fees for permits."

Santa Cruz Dealers Hold Cooking School

First all-electric cooking school in the Santa Cruz (Calif.) area was held recently in the auditorium of the new Laurel School in Santa Cruz by the Santa Cruz *Evening News* and five electrical contractor-dealers of the town. The school proved to be most popular and successful and drew a total attendance of more than 18,000 during the four days it was held. Participating dealers were Frank Carroll Electric Co., Cox Electric Co., John Holt Electric Co., Irvin M. Smith Electric Co. and the Soquel Electric Shop.

The stage was equipped with sink, utility cabinet, tables, several types of electric ranges and two electric refrigerators. Each day a different range was used for demonstration. Mrs. Ruth Menke of San Francisco was the demonstrator, ably assisted by Mrs. Raymond Lord of Santa Cruz.

Each of the contractor-dealers erected booths around the sides of the auditorium in which small appliances were demonstrated during the entire day, except between the hours of 2 and 4:30 p.m., when the cooking school proper was held. Orders were taken at the booths for delivery of small appliances. At the close of each day's session the food cooked during the afternoon was given away as door prizes, in addition to numerous other merchandise prizes offered by the Santa Cruz merchants.

At the close of the school an electric range was given away, donated by the contractor-dealers and the Coast Counties Gas & Electric Co., which serves that area.

The cooking school was sponsored by the contractor-dealers. The utility company cooperated with them by subscribing to daily newspaper institutional advertising, telling the story of "Electricity" and leaving the merchandise advertising entirely to the dealers.

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NE PAGE-MCKENNY, SEATTLE, on a bid of approximately $60,000, received contract for electrical work, including wiring, fixtures, switch and panel boards, to be installed in the new federal office building under erection at First Ave. and Marion Sts., Seattle.

GILLETTE & MCLAREN, manufacturers' representatives, have moved their Seattle headquarters from 408 Mutual Life Bldg. to 2128 Westlake Ave.

H. H. WALKER, Electragist of Los Angeles, is rapidly completing the electrical work at the new State Building in Los Angeles. A special feature of the construction was the devising of a special hydraulic pipe bender for large sizes of pipe. The number of large conduits used in the installation justified the building of this special bender.

THE MURPHY ELECTRIC CO., 722 Yates St., Victoria, B.C., has just completed the installation of an entirely new front for its store, and has also changed the interior layout. R. T. Murphy and G. Murphy are partners in this electric business, which has been operated in Victoria for the past twenty years.

CLARK P. MALCHO, who for several years has specialized in electrical work in orange packing plants in the navel orange district of Claremont and Glendora, Calif., has opened the Malcho Electric Store at 342 West Center St., Anaheim, Calif.

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Inspectors' Chief

Frank Short, electrical engineer with the Industrial Accident Commission, is the new president of the Southwestern Section, International Assn. of Electrical Inspectors

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AMONG RECENTLY COMPLETED installations of Quality Electric Co., Los Angeles, were jobs at the new plant of the Rheem Mfg. Co., makers of oil drums, gas pumps, etc., in Los Angeles. Electric ovens for drying of japan and paint were installed. The model plant of the Helms Bakery at Culver City, with electric ovens and power machinery, was also completed recently. Another electric oven job was that of the enameling oven of the Worley Co., on Pico St., Los Angeles, manufacturer of metal furniture. Just the opposite type of installation was one made for the pre-cooling of oranges at the Olive Heights Citrus Assn., and another at the Tustin Hills Citrus Assn. in Orange County.

STUECKLE & MILLINGS ELECTRIC CO., Anaheim, Calif., has moved into its new building at 613 South Los Angeles St., and now occupies 1,500 ft. of store space completely stocked with fixtures and appliances. This firm formerly operated as the Bungalow Electric Co. F. Stueckle and J. W. Millings are the owners.

C. A. HUNTLEY, formerly store manager for Washer Wilson Co., has opened a washing machine shop for service and sales at 561 Somerset Blvd., Bellflower, Calif.

Wins McGraw Award For Certification Idea

The contractor-dealer medal and purse for 1931, given under the James H. McGraw Award, was presented to George D. Munger, secretary-manager of the Hudson Valley chapter of the Association of Electragists—International, and the Hudson Valley Electrical League, at the A.E.I. convention at Hot Springs, Ark., the first week of October.

Recognition was thus awarded for Mr. Munger's constructive contribution to the advancement of the contractor-dealer branch of the industry by demonstrating in seventeen communities of the Hudson River Valley a practical plan for promoting the prosperity of the local contractor by organizing the progressive members of the trade to higher standards of service as "Certified Electric Contractors."

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TWO LARGE ESTATES near San Diego in what is known as "Bonita Hills," both designed by Robert W. Snyder, architect, have been completely electrified by the Airport Electric Company, of San Diego. The first is one belonging to Mary Volkman, authoress, the second to H. T. Horton, of the Chicago Bridge & Iron Works. In the Horton residence are installed an 11-kw. range, two water heaters totaling 8 kw., 70 kw. in air heating, 15 kw. in lighting, and 4 kw. in motor equipment, a total of 108 kw. The economy of the all-electric operation is shown by an average cost per kilowatt-hour of 0.0223 cent, or an average of 39 cents per month per kilowatt connected, as the eleven-month bill totals $458.12, an average of $13.65 for the heating per month, or an average of $28 total electric bill per month.

THE CITY ELECTRIC & FIXTURE CO., Seattle, has secured contract for electrical equipment for the new $350,000 steel and concrete bridge over the Duwamish Waterway, on a bid of $8,000. Award includes two 60-hp. motors, one 5-hp. motor, navigation and bridge lights, wiring and conduit.

BOWLES ELECTRIC CO., San Clemente, Calif., has opened a branch store at 246 Forrest Ave., Laguna Beach, Calif.

R. DOLL, partner in the firm of Mactolf-Doll, Electragists of Glendale, Calif., spent a vacation in the Northwest and stopped off on his way home at the San Francisco Electragists' meeting Oct. 1.

R. R. REID, national executive committeeman from the Mountain Division of the Electragists, attended the 31st convention of A.E.I. at Hot Springs, Ark.

CHAMBERLIN ELECTRIC COMPANY, of Santa Paula, Calif., has recently completed the wiring of a new Masonic Temple being built there.

Manufacturer Distributor

Hotpoint Range Promotion Program Is Announced

An advertising and sales promotion program to gain public acceptance for electric cookery, of far greater magnitude than ever before conceived, will be launched by General Electric Hotpoint in January, 1932, according to George A. Hughes, president, Edison General Electric Appliance Co., Inc.

In size of advertising budget, scope of operations, and distribution set-up, this program will follow closely the plan of development which has been used in the past four years for promotion of the electric refrigerator. Electric cookery promotion, according to Mr. Hughes, is regarded by executives of the electrical industry as the next logical step in the development of electric labor-saving devices. Ranges having been brought to their present degree of perfection, it now remains only to break down popular misconceptions regarding electric cookery for them to win the success enjoyed by the electric refrigerator.

"Aggressive sales promotion and maximum selling activity," said Mr. Hughes, "are far more essential to the growth of the range business than lower energy rates or lower range prices. Nor can the objective of increased range sales be reached if central stations are forced to shoulder, as they now are, the entire burden of selling the consumer. A plan of increasing range sales will be successful only when independent distributors and dealers, corresponding to those now doing 75 per cent of the general appliance and refrigerator business, can be attracted to electric range selling. This, of course, means two things: First, it means a re-alignment of the distribution set-up to provide for distributors and retail outlets in greatly increased numbers. Second, it means the sort of aggressive advertising and selling program which put across the electric refrigerator, and which is now being launched to put across the electric range."

In practically every section of the country, present range sales organizations will be taken over as rapidly as possible by authorized General Electric range distributors, who will develop an increasingly large additional range market. Not only will these distributors undertake the sale of ranges on a retail basis; they will extend to all retail outlets and utilities in their territories more advertising and sales cooperation than ever before. To all this activity will be added the force of the national magazine, radio and general publicity campaign, and the local advertising done by distributors, utilities and other retailers.

The 3-yr. program is sponsored by the National Electric Light Association through its domestic electric range committee.

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New to the West

J. J. GARDNER

. . . comes West this month as Pacific Coast representative of R. W. Cramer & Co., 67 Irving Place, New York. Sales and service activities on Sauter time switch equipment will be handled from San Francisco by Mr. Gardner

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HOTPOINT CONTEST WINNERS ANNOUNCED—Prize awards have been made in the contest conducted for a suitable name for the new General Electric-Hotpoint rubber heating pad. Marion K. Granville, 303 Carroll St., Saginaw, Mich., is the winner of the first prize of $250 for the name "Sano-Flex." Thirty-three prizes in all were given.

NORMAN L. BOST, Seattle, Northwest representative of the National Electrical Products Corp., accompanied by George E. Bowermaster, wire engineer of his company, has covered the Pacific Northwest field recently, establishing jobbers to handle National Fire Stop Wire. Among distributors named is Fobes Supply Co. of Seattle and Portland.

NORGE CORP. ACQUIRES ALASKA REFRIGERATOR—Announcement is made of the completion of the acquisition of the physical properties of the Alaska Refrigerator Co., of Muskegon, Mich., by Norge Corp., electric refrigeration division of Borg-Warner Corp. Alaska Refrigerator Co. has for several years been manufacturing cabinets for Norge, and its plant has also been used for assembling Norge refrigerators.

GOVERNMENT FIGURES for 1930 on number of poles treated in that year show an increase over 1929 of 21 per cent in the number of pine poles treated. Pine poles represented the largest number of all woods treated during the year, Western red cedar occupying second place. Treatment of the latter fell off 17 per cent in 1930 in comparison with 1929.

Westinghouse Announces Refrigerator Plans

Distribution of the Westinghouse refrigerator on the Pacific Coast will be accomplished through the appointment of metropolitan distributors in the larger cities, with the Westinghouse Supply Co.'s own organization supplying dealers in the outlying communities, it was announced in San Francisco last month by Ivan L. de Jongh, Pacific Coast manager of the Westinghouse company's refrigeration department.

One or more retail stores handling refrigerators only will be opened up in each city by the metropolitan distributor under his own name. In addition, the refrigerators will be sold by established retal electrical stores. Dealers appointed by the Westinghouse Supply Co. in the smaller localities will handle a full line of Westinghouse refrigerators.

Metropolitan distributors already appointed in this territory are as follows:

San Diego: La Motte & Callaway (distributor for San Diego and Imperial Counties).

Los Angeles: Ray Thomas, Inc. (distributor for Los Angeles, Pasadena, Santa Monica, Hollywood, Beverly Hills, Glendale and Long Beach).

San Francisco: Colvin-Templeton, Inc. (distributor for San Mateo, Contra Costa, Alameda and San Francisco Counties).

Salt Lake City: Intermountain Electric Co. (distributor for both Salt Lake City and surrounding territory in Utah and Idaho).

Denver: Intermountain Appliance Co.

A retail store handling Westinghouse refrigerators has already been opened in San Diego by La Motte & Callaway. Stores are to be opened in San Francisco, Oakland and Los Angeles about Dec. 1. In Denver a store has been opened under the name of the Household Appliance Co.

In the Northwest distribution of Westinghouse refrigerators has been carried on by Fobes Supply Co., a Westinghouse subsidiary with headquarters at Seattle and Portland, for several months. No metropolitan distributors have so far been appointed in that territory.

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JAMES R. KEARNEY CORP. HAS NEW FACTORY BUILDING—A new factory has been occupied recently in St. Louis, Mo., by the James R. Kearney Corp. Picturesque, in that it is finished in a Spanish type of green stucco with ornamental iron fixtures, the new factory has three times the floor space of the company's former plant and is furnished with the latest equipment and time-saving devices.

THE CODE ELECTRIC PRODUCTS CORP., is the new firm name of the business conducted by Morgan J. Lewis in Philadelphia. The corporation manufactures the "Code" type meter connection block and other electrical equipment.

H. B. Squires Expands Business to Cover Coast

Brad Squires, Inc., is a new organization formed to take over representation of the lines formerly handled by H. B. Squires. Offices of Brad Squires, Inc., have been established at 1703 Maple Ave., Los Angeles, and at 1201 24th St., Oakland. A Portland office will be opened in the near future.

H. B. ("Brad") Squires, who heads the new concern, has been affiliated with the electrical industry for a number of years. He founded and served as president of the H. B. Squires Co., of San Francisco, Los Angeles and Seattle. Subsequently he sold out his interest in that company, and some time later organized an agency in Los Angeles which he operated under his own name.

Manufacturers now being represented on the Pacific Coast by Brad Squires, Inc., include Federal Electric Co. and Wolverine Tube Co., of Chicago; R. H. Greene Co., Inc., Oakland; Grolan Mfg. Co. and Thomas-Smith Co., Dayton, Ohio; and Electrical Fittings & Equipment Co., Detroit.

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A. H. Jaeger Joins Electromaster, Inc.

The appointment of A. H. Jaeger as general sales manager is announced by R. B. Marshall, general manager of Electromaster Inc., Detroit, manufacturer of Electrochef electric ranges.

Mr. Jaeger will be remembered in the West for his experience in the electrical specialty field in this territory. As manager of an electrical jobbing house in Seattle he promoted the sale of many major electrical household devices and electrical supplies. In 1916 he became the range specialist of Hotpoint Electrical Heating Co. of California. In 1926 he was appliance division sales manager of that company; he resigned to become sales manager and secretary of the Leonard Refrigerator Co. of Grand Rapids, Mich., and subsequently was promoted to first vice-president in charge of sales. He has served on the merchandising and electric refrigerator committees of the N.E.L.A., and he has also been chairman of the executive committee of the National Refrigerator Manufacturers' Assn.

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DISTRIBUTION COST STUDY — Results of a survey of electrical distribution conducted by the U. S. Department of Commerce are published in a booklet entitled "Problems of Wholesale Electrical Goods Distribution," recently issued by the Department. The survey was made at the request of the National Electrical Wholesalers' Assn., and chosen for the study was a concern with an annual sales volume of less than $500,000, doing business in a southern state. The firm is a branch of an establishment with headquarters in a larger city, which, in turn, is affiliated with one of the national electrical concerns as a distributor. The branch under survey attempts to serve nearly all of the electrical needs of a growing industrial community, with customers ranging from contractors and dealers to industrial concerns and municipalities. Analyses of the firm's business are exhaustive and are presented in such a way that any merchant should be able to apply them to his own business. Copies of the survey (Distribution Cost Studies—No. 9) are obtainable from the Superintendent of Documents, Washington, D. C., at 15c. apiece.

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New Washing Machine Co. To Start Production

Announcement has been made to the trade of the formation of "Major Appliances, Inc.," with offices and plant at Peoria, Ill. R. W. Gorham, until recently Pacific Coast sales manager of Altorfer Bros. Co., and before that general sales manager of that company for ten years, is president and treasurer of the new company. A. J. Hartley, of the Hart-Carter Co., of Peoria, is vice-president and secretary.

A general line of low-priced washing machines will be marketed under the name "Utility." These will be sold to dealers C.O.D. only. No consumer advertising campaign is contemplated, since the policy of the new concern is to carry a minimum of selling overhead. The company also intends to manufacture an ironer. Manufacture will be carried on at the Hart-Carter Co. plant at Peoria, Ill.

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J. G. CORRIN has returned to Los Angeles from the East and is representing the Pennsylvania Transformer Co., Pittsburgh, Pa.; Condenser Corp. of America, Jersey City, N. J.; and Meter Devices Co., Canton, Ohio. His headquarters are at 140 North Sycamore Ave. Mr. Corrin had been in charge of the Transformer Division of American Brown Boveri Co., Inc., of Camden, N. J., up to the time of the recent purchase of that company by the Allis-Chalmers Mfg. Co., of Milwaukee. Formerly he was in business in Los Angeles, representing the Packard Electric Co., later purchased by American Brown Boveri Co.

JEFFERSON ELECTRIC CO., of Chicago, has purchased a nineteen-acre tract in Bellwood, a suburb of Chicago, on which it will erect a $550,000 manufacturing plant. This will house in one building the company's two present Chicago plants.

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Phoenix Branch of Westinghouse Supply Co.

ONE of the most complete electrical wholesale houses between Dallas and Los Angeles in this rebuilt Phoenix branch of the Westinghouse Electric Supply Co. The building, of wire cut red brick, now has hardwood floors throughout and provides about 15,000 ft. of floor space, a part of which is used for a large office and display room. Shipping is done from the front shipping door, rear doors adjacent to the railroad siding permitting the unloading of carload merchandise direct into the warehouse without the use of a hoist. Steel shelving has been installed throughout.

This Westinghouse branch is a unit of the division comprising Los Angeles, Long Beach and Phoenix, of which D. C. Pence, of Los Angeles, is division sales manager. Frank Waite is manager of the Phoenix branch. In addition to a stock of practically all items carried by the Los Angeles office, a considerable quantity of 25-cycle motors and other material to meet local frequency conditions is being handled at the Phoenix headquarters.

New Products

Electric "Notifier"

Two new electric clock features have been incorporated in the electric "Notifier" just brought by the Chicago Flexible Shaft Co., 5600 Roosevelt Road, Chicago. This addition to the company's line of Eternatime electric clocks is a 24-hour alarm clock that never needs re-setting once it has been set for the required rising hour. After being shut off one morning it will ring again the next without being re-set. The "Notifier" can be set to ring at the expiration of any period from 1 min. to 3 hr. Retail price, $12.50.—ELECTRICAL WEST, Dec. 1, 1931.

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Automatic Toaster

Electro Mfg. Co. of America, 32nd and Arch Sts., Philadelphia, has just brought out the Electro automatic toaster illustrated. Toasting two slices of bread at once, the toaster is quiet in operation; the lever at the side is pushed back to turn on the current, and when the toast is done the current is automatically turned off and the toast is ejected. An adjustment knob at the back provides for the making of light or dark toast. There is a removable drawer for the easy disposal of crumbs and 6 ft. of silk-covered asbestos heater cord and attachment plug are supplied. Finish is chromium plate with colored trim. Retail price, $9.95.—ELECTRICAL WEST, Dec. 1, 1931.

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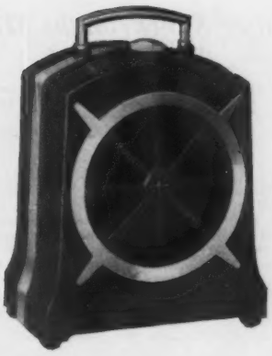
ABC Low-Priced Washer

Altorfer Bros. Co., Peoria, Ill., has entered the low-priced washer field with the ABC Liberty. The action of the flexible balloon roll of this washer's swinging wringer is an innovation, four equalized springs controlling the wringer pressure. Other features of the Liberty are oversize balloon rolls, three-wing floating agitator, Westinghouse motor, full 55-lb. capacity and gray porcelain enamel exterior and interior finish.—ELECTRICAL WEST, Dec. 1, 1931.



Air Conditioner

The new Hexcel air conditioner brought out by the Hexcel Radiator Co., of Milwaukee, Wis., is a combination portable electric heater and air cooler. The appliance differs from the usual hot-air circulating heaters in that water is used as a medium to distribute the heat evenly in the core from which it is circulated by means of a fan, the heating element being immersed in the water. The device is about the size of a midget radio, weighs less than 15 lb. and is finished in walnut ripple with polished trimmings.—ELECTRICAL WEST, Dec. 1, 1931.

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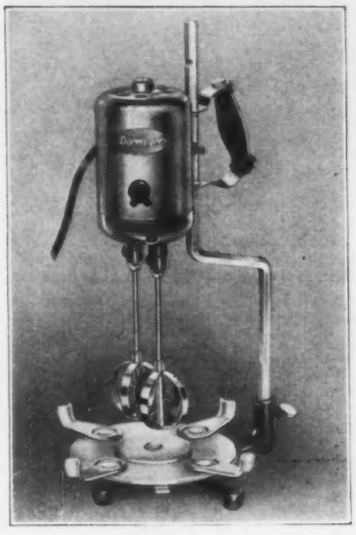
Dormeyer Food Mixer

A new Royal model chrome-plated mixer and juice extractor just brought out by the A. F. Dormeyer Mfg. Co., Chicago, is equipped with a stand to which either appliance can be easily attached as shown. The base of the stand is a ball-bearing revolving turntable with adjustable fingers for holding bowls of every size.—ELECTRICAL WEST, Dec. 1, 1931.



Junior Washer

The Meadows Junior is a small size washer just brought out by The Meadows Mfg. Co., Bloomington, Ill., for sale to small families or where space is limited. The porcelain enamel tub of the Junior is of two-sheet capacity, and is unusually easy to fill and drain. The ingenious, fully automatic wringer is adjustable to the height of the sink. Shipping weight 120 lb.—ELECTRICAL WEST, Dec. 1, 1931.

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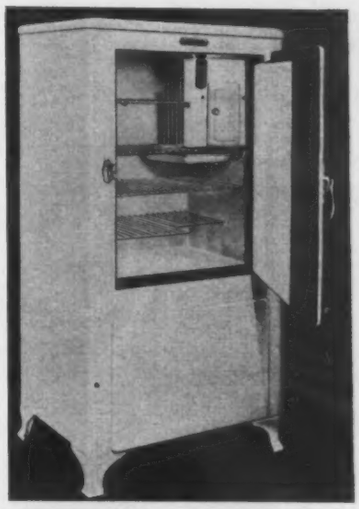

1932 Refrigerator Models

Holbrook Mfg. Co., Los Angeles, has just announced its 1932 line of household electric refrigerators. Cabinets as well as freezing units have been redesigned, with the result that the three new models are quieter in operation, have a wider range of freezing speeds, use less current and have lowered delivered prices. All are of the same single-door design, models varying only in the size of cabinet capacity.

Specifications of the three new models are as follows: Model 70—Laminated 4-in. insulation; 4 trays; 84 cubes of ice. Outside measurements: 60 in. high; 31 in. wide; 22¾ in. deep; 7.07-cu. ft. capacity. Model 60—Laminated 3½-in. insulation; 4 trays; 84 cubes of ice. Outside measurements: 53¼ in. high; 27¼ in wide; 22¾ in. deep; 5.50-cu. ft. capacity. Model 50—Laminated 3-in. insulation; 3 trays; 54 cubes of ice. Outside measurements: 52½ in. high; 24½ in. wide; 22¾ in. deep; 4.51-cu. ft. capacity. Retail prices, f.o.b. Los Angeles, $249., $215., and $179. respectively.—ELECTRICAL WEST, Dec. 1, 1931.

Metal-Clad Circuit Breaker

The Delta-Star Electric Co., Chicago, has developed this new single-circuit three-pole metal-clad oil circuit breaker unit for service up to 7.5 kv. The circuit breaker is solenoid operated from a d.c. 100-125-volt service. If overload protection is desired current transformers and overload relays can be furnished.

The self-contained control unit with its fuses, indicating lamps and control switch are all mounted in the front compartment, thus eliminating field wiring and extra conduit runs.—ELECTRICAL WEST, Dec. 1, 1931.

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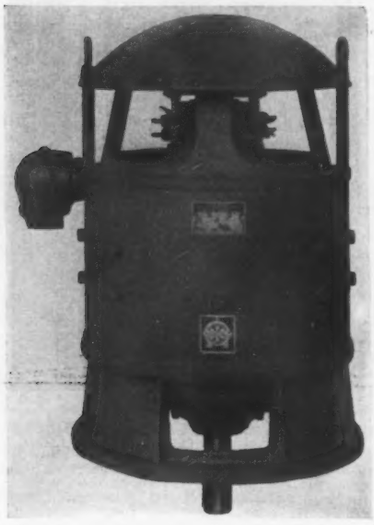


D. C. Vertical Motors

The Reliance Electric & Engineering Co., Cleveland, Ohio, has developed its type "T" d.c. motors for vertical operation in sizes up to 50 hp., 1,150 r.p.m.

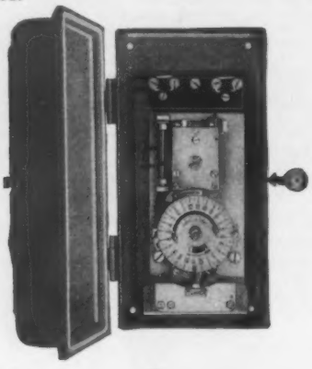
These motors are provided with a ring base for mounting and a drip cover to protect them from falling dirt and chips and from dripping water, oil or other injurious solutions. Where it is desirable the motor can be mounted direct to the machine being driven without the ring base and appear as an integral part of the machine.

Amply large bearings are used to take up the thrust load or weight of the armature. Two heavy eye-bolts are provided to make handling easy.—ELECTRICAL WEST, Dec. 1, 1931.

Sauter Synchronous Motor Time Switch

The outstanding feature of the new low-priced Sauter time switch being marketed by R. W. Cramer & Co., Inc., 67 Irving Place, New York, is a self-starting, slow-speed synchronous motor. The device is designed especially to control multiple street lighting, sign and store window lighting, off-peak water heating and other time controlled circuits.

The Sauter time switch is equipped with laminated brush-type copper contacts with silver arcing tips—quick make and quick break—and can be furnished in 2-, 10,- 15- and 25-amp. capacities for 110/220 volts. The synchronous motor is for use on 110 volts, 60 cycles. The unit is mounted in a pressed-steel housing with convenient knockouts for conduit connections. It may be had with an astronomic dial to control the operating time automatically in step with the change of sunset and sunrise through the year.—ELECTRICAL WEST, Dec. 1, 1931.



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Watthour Meter

The Westinghouse Electric & Mfg. Co., Newark, N.J., recently has developed and placed on the market the type RB recording-demand watthour meter, an instrument that indicates on a four-counter dial the total kilowatt-hours consumed, and records on a chart the integrated demand in kilowatts over successive, predetermined intervals.—ELECTRICAL WEST, Dec. 1, 1931

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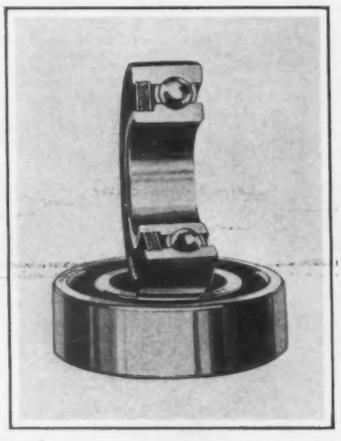
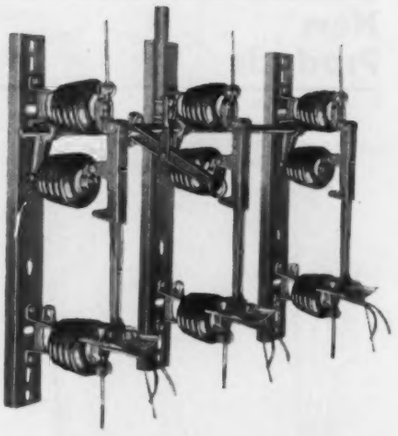


Self-protected Ball Bearing

A new "7000" series of felt-protected, closed-type ball bearings is announced by the Norma-Hoffman Bearings Corp., Stamford, Conn. The new unit is an all-steel, lubricant-packed, dirt-and-moisture-proof bearing with wide, solid inner and outer rings. The design is such that it can be clamped on both sides, and it will carry substantial thrust loads in either direction, in combination with the radial load. There is ample space for grease, thus reducing the attention needed for proper lubrication. This bearing is made in a full range of sizes and interchanges in overall dimensions with all other makes of self-protected bearings.—ELECTRICAL WEST, Dec. 1, 1931.



Gang Operated Switch

A quick-break gang operated switch, light in weight, moderate in price and sturdily built, is the latest development in gang switches offered by the James R. Kearney Corp., of St. Louis.

These switches are being made in two-, three- and four-pole gangs and can be operated with a simple disconnect puller if desired. Connections to the line are made with solderless wire connectors, eliminating the soldered plug connection. The disconnect blade rolls out of the contacts with a wrist-like motion under high leverage, breaking any ice or dirt seal. When the blade leaves the contacts, a completely enclosed helical spring opens the blade with high velocity.—ELECTRICAL WEST, Dec. 1, 1931.

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Wire- and Motor-Calculator

A handy pocket calculator for computing wire sizes and motor characteristics by simple means has been devised by Frank Short, president of the Southwestern Section, International Association of Electrical Inspectors. Distribution of the device is being made by the affiliated Diamond E-Square D organization.

Mr. Short's calculator combines in one operation all of the necessary information regarding each type of motor for each rated horsepower. A simple turn of a small dial to the horsepower of the motor gives the wire size, conduit size, ampere starting currents and other information necessary to the wireman.

The device is well made of celluloid with a brass trimming and should last a long time. It fits the pocket and can be carried about by wiremen and contractors on all jobs.—ELECTRICAL WEST, Dec. 1, 1931.

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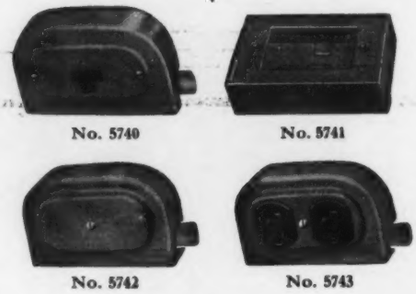
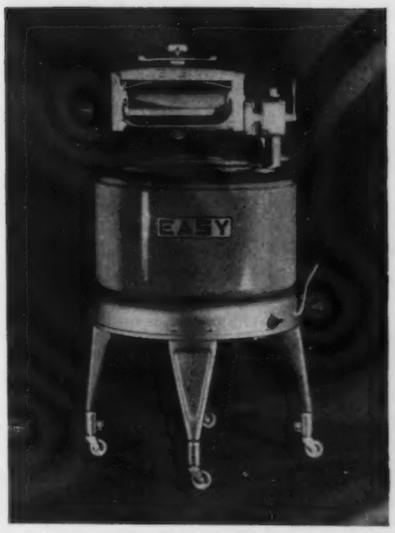


No. 5740 No. 5741

No. 5742 No. 5743

Border Line Fittings

The Wiremold Co., Hartford, Conn., has added additional fittings for baseboard and other interior trim to its surface wiring system. These fittings have been neatly designed so that when installed with "Wiremold" they become an element of the trim itself. Lighting and convenience outlets can be placed where they are needed without the necessity of stringing wires around and over furniture, taking up floors, or digging into the walls to conceal the wiring, and at the same time the appearance of the room is not marred.—ELECTRICAL WEST, Dec. 1, 1931.



Two Easy Washers

Two new models of Easy washers have been introduced by the Syracuse Washing Machine Corp., Syracuse, N. Y.

Model 3F, made to sell in the low-price field, is a wringer-agitator type washer with the following features: balloon type rolls, family size capacity, and mottled gray porcelain enameled tub with satin silver base, legs and wringer.

Model 4F, of larger capacity and designed to sell in the intermediate price field, has an electric pump with which to empty the tub when the washing is finished. This washer has a beige porcelain enameled tub and French gray base, legs and wringer.—ELECTRICAL WEST, Dec. 1, 1931.

▼

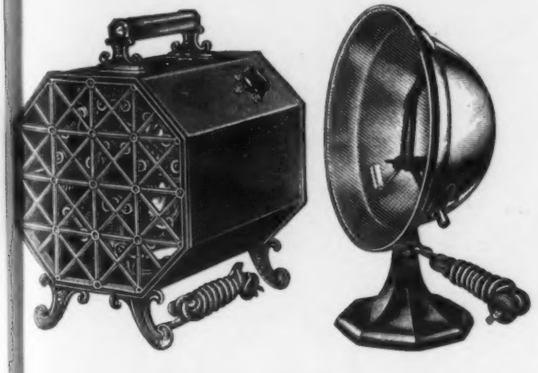
Heater and Health Lamp

A heat convector and a carbon-arc lamp are two new Star-Rite appliances announced by the Fitzgerald Mfg. Co., Torrington, Conn.

The heat convector is so designed that it distributes either hot or cold air quickly over a wide area. If warm air is desired, the cold air is sucked up from the floor, heated, and electrically fanned in a gentle breeze to all parts of the room, or the fan in the convector can be operated alone to create a current of cool air.

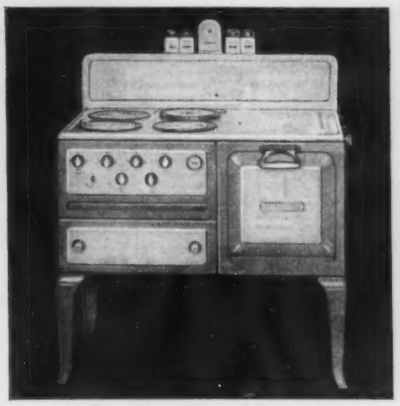
The Star-Rite carbon-arc lamp is equipped with two sets of Eveready Sunshine carbons which operate approximately 50 min. One set of goggles is also provided. The lamp is rated at 800 watts, 10 amp., and operates on 110-120 voltage a.c. or d.c. It is designed to produce both ultra-violet and infra-red rays.

For those who desire a support for the lamp, a sturdy, nickel plated tripod is obtainable. This is adjustable to various heights, and on it the lamp may be tilted to any angle.—ELECTRICAL WEST, Dec. 1, 1931.



Universal Table Top Range

White and French gray full porcelain enamel finish with chromium trim, four open units, automatic oven control with heat signal, heavily insulated, porcelain oven and commodious warming drawer on roller bearings are features of the new Universal table top range brought out by Landers, Frary & Clark, New Britain, Conn. The cooking top of this range measures 41 x 23⅝ in.; the oven 14 x 14 x 19 in. An economy cooker is available to replace one of the four open units, and a finish of Jade green and Ivory is offered for those who prefer it. A handy convenience outlet is placed on the front of the range.—ELECTRICAL WEST, Dec. 1, 1931.



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Screw Ring Receptacles

A complete new line of screw-ring receptacles, including screw terminal, loop terminal and wire lead type, is announced by Cutler-Hammer, Inc., 234 N. 12th St., Milwaukee, Wis. A departure from the usual is incorporated in these new devices: The body is made of heavy walled Thermoplax which is shatter proof and does not chip easily, thus reducing breakage in handling and installing and giving a more clean-cut appearance. The screw-ring is of porcelain to harmonize with other devices if used for replacement. The copper screw shell can be removed easily and quickly from the front of the sign. The large terminal screws are staked to save time and prevent loss.—ELECTRICAL WEST, Dec. 1, 1931.

▼

Porcelain Guy Insulator

Locke Insulator Corp., Baltimore, Md., has developed a porcelain guy insulator to replace cumbersome wood insulators now extensively in use on wood pole lines.

These insulators have ample mechanical strength, show no deterioration with age of either surface or strength, are not easily broken and have electrical characteristics equal to wood insulators of at least twice the length. Since no arcing horns are required the line presents a considerably better appearance and does not interfere with secondary circuits on the same poles, as is the case with the horns on wood insulators. The insulators are easily coupled in series where greater flashover values are desirable.—ELECTRICAL WEST, Dec. 1, 1931.

Trade Literature

¶ BUSBAR CHANNELS— "Channeluminum" is the title of a new booklet published by the Aluminum Co. of America, Pittsburgh, Pa., on the application and use of aluminum structural channels for busbars. Illustrations showing actual installations and methods of mounting as well as tables of specifications and characteristics are included. Supports, take-offs and joints for this new busbar shape are also described. High strength, reduced space requirements and ease of installation are stressed as characteristics of the design.

¶ BUILT-IN AND PORTABLE ELECTRIC HEATERS—A recently issued circular of the Com-fo-lator Co., Ltd., a division of Smoot-Holman Co., Inglewood, Calif., describes the new wall-type heater being manufactured by this company.

¶ SHOW CASE LIGHTING—Wadsworth show case lighting units are the subject of bulletin No. R917 recently issued by The Wadsworth Electric Mfg. Co., Inc., Covington, Ky.

¶ SUNBEAM CATALOG—Catalog No. 43 of the Chicago Flexible Shaft Co., Chicago, gives descriptions, illustrations and prices of the complete line of Sunbeam electric appliances manufactured by this company.

¶ LIGHTING SPECIALTIES—Kliegl Bros., 321 West 50th St., New York, have published a completely revised catalog of their devices for theatrical, decorative and spectacular lighting.

¶ "PHONO-ELECTRIC ALLOYS"—This is the title of a 70-page booklet just published by the Bridgeport Brass Co., Bridgeport, Conn. The book presents a history of the development and application of these alloys in the trolley and electrified railway field. It also covers catenary construction, data on stranded conductors, composite strand, communication lines, messenger strand and guy strand. A chapter is devoted to the application of "Duronze" for the manufacture of pole line hardware, bolts, nuts, screws, etc.

¶ CABLE TERMINATOR INSTALLATION—A set of five instruction sheets giving complete directions for the installation of single-conductor cable terminators has been issued by the Delta-Star Electric Co., 2400 Block, Fulton St., Chicago.

¶ LIGHTING FIXTURES—A new catalog of stock and made-to-order lighting equipment for public and commercial buildings has been issued by the Day-Brite Reflector Co., St. Louis, Mo.

¶ APPLIANCE CATALOG—Landers, Frary & Clark, New Britain, Conn., is distributing to the trade a catalog of electric appliances selected from the best sellers of the Universal line. The catalog also contains the first showing of the company's Landers line of popular-priced appliances.

¶ INSULATORS—A new catalog of its high-voltage porcelain and transmission line hardware has been issued by the Lapp Insulator Co., Inc., Le Roy, N.Y. A section of the catalog is devoted to distribution and farm line construction materials, another is a switch and bus insulator section; transmission clamps, fittings and miscellaneous hardware comprise a third section.

¶ WESTINGHOUSE APPLIANCES — Descriptions and prices of its complete line of small appliances are included in a new 1931-32 catalog (No. 285) of the merchandising department of the Westinghouse Electric & Mfg. Co., Mansfield Ohio.

¶ FOOTBALL FIELD LIGHTING — Lighting equipment of the Crouse-Hinds Co., Syracuse, N.Y., for the floodlighting of football fields is the subject of that company's bulletin No. 2241.

¶ SWITCH CATALOG—The Federal Steel Products Co., Newark, N.J., has published catalog No. 318 in which are listed and described this company's lines of electric safety switches, motor starting switches, residence panels, cutout boxes, steel cabinets and junction boxes.

Barometer

OCTOBER industrial operations in the Western states were, on the whole, on the same level of activity as in September, according to an analysis of returns on electrical energy used in manufacturing establishments. In common with the rest of the country, the West has had but little change in this respect during the past four or five months. Compared with 1930 the October index is down 12 per cent; compared with 1929, 24 per cent.

Foods, forest products and the metal industries show but slight changes from September though all are lower than they were a year ago. The last named, however, is the only one that has shown a really striking decline. The returns show less than half the energy consumption and hence presumably less than half the production of a year ago. This condition has been reached gradually by a progressive decline of unusual magnitude from the early part of 1929 until last August, when the movement apparently came to an end. Since that time there has been no change of importance.

An increase of 13 per cent brought the chemical industry considerably higher than in October of 1930, but the latter was abnormally low. The present level is about that of September, 1930. This industry is the only one that ranks higher than it did a year ago. Although a decrease occurred from September, the change was generally nothing more than a return to July or August levels after an intervening spurt.

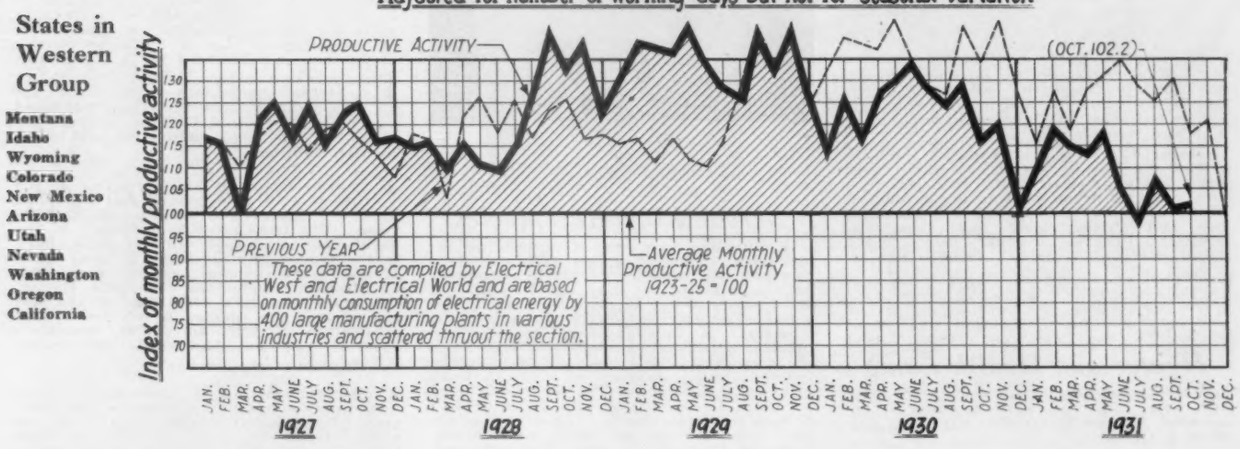
Indexes of Manufacturing Activity in the Western States

(All figures adjusted for number of working days.)

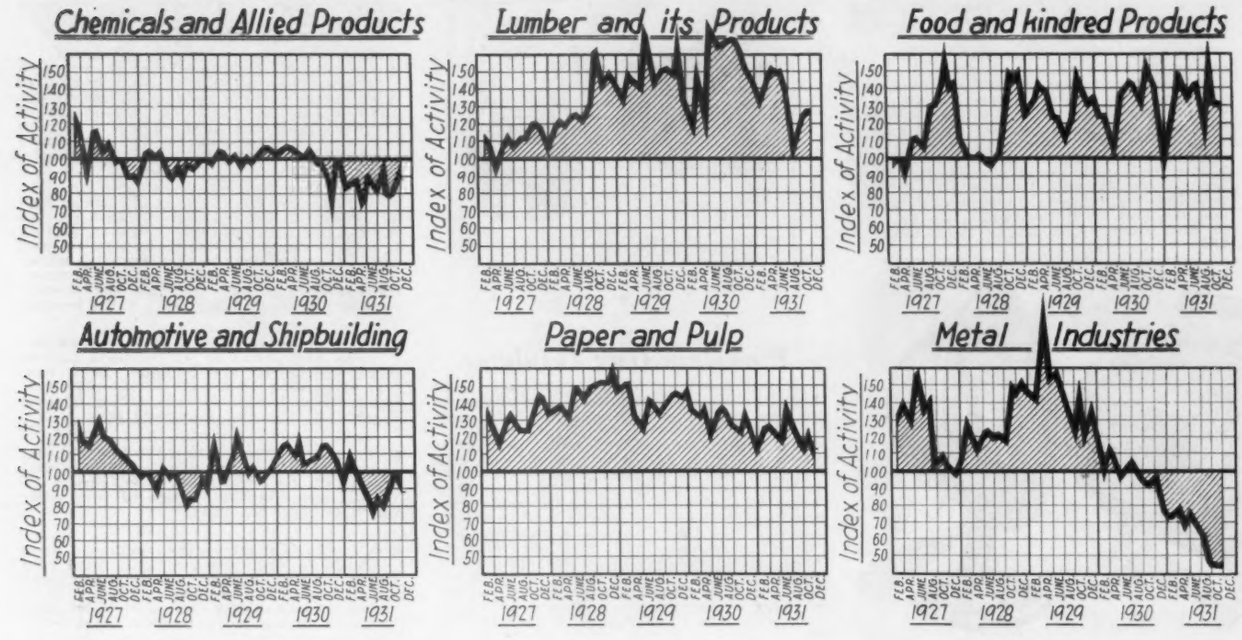
	October, 1931	September, 1931	August, 1931	October, 1930	Average for 10 months 1931	Average for 10 months 1930
All industry	102.2	102.3	108.8	116.1	109.6	125.4
Chemicals	88.0	78.1	77.1	64.1	81.4	98.7
Food	131.8	134.5	165.0	148.1	140.9	136.6
Forest products	128.1	129.0	125.4	164.0	137.1	158.6
Metals group	42.5	43.4	43.8	92.3	59.2	99.1
Paper and pulp	112.8	126.3	115.5	137.2	125.5	132.1
Rubber	107.4	115.1	103.1	151.5	143.0	158.8
Shipbuilding	88.1	96.2	85.2	113.0	89.2	113.8
Stone, clay and glass	87.3	93.9	96.5	92.0	91.9	101.4

General Productive Activity in the Western States

Adjusted for number of working days but not for seasonal variation



Productive Activity in the Primary Industries of the Western States



DURING THE FIRST HALF OF...

75 PUBLIC UTILITY COMPANIES AVAILED THEMSELVES OF...

FRIGIDAIRE'S INDIVIDUALIZED SALES SERVICE

AND HERE ARE THE REASONS...

FRIGIDAIRE FROM EVERY VIEWPOINT APPEALS TO A UTILITY AS A PRODUCT WORTHY OF SPECIAL SALES EFFORT

1 It is easy to sell. It is nationally advertised. It is preferred by the majority.

2 It is a product of outstanding quality and value. Nothing has been spared to make Frigidaire the finest product that it is humanly possible to build.

3 It is guaranteed for three years.

4 It builds up the "constant" load on the power lines.

5 It is a profitable product — for the utility and for the utility's salesmen.

AND IN ADDITION, the utility can supply EVERY PROSPECT who needs refrigeration—for Frigidaire products embrace every refrigeration requirement: many models for household prospects... a complete line of coils and compressors for any type of commercial installation... water coolers, room coolers, dehumidifiers and milk cooling equipment.

FRIGIDAIRE

NEW LOW PRICES NOW IN EFFECT

AND HERE ARE THE REASONS...

FRIGIDAIRE SALES SERVICE HELPS UTILITY CAMPAIGNS PRODUCE RESULTS AND SAVES TIME FOR EVERYONE CONCERNED

1 Frigidaire's Sales Plans are so flexible that they can be made to suit the individual requirements of each utility company.

2 Frigidaire Sales Plans save the time of utility executives and reduce detail work to a minimum.

3 Frigidaire plans have the merchandising angle always uppermost—insuring a successful campaign.

4 They are planned to interest salesmen and employees and secure their whole-hearted cooperation.

5 They are planned to yield a profit to the utility.

6 They are complete in every detail.

FRIGIDAIRE

NEW LOW PRICES NOW IN EFFECT

LET US GIVE YOU COMPLETE DETAILS OF FRIGIDAIRE'S INDIVIDUALIZED SALES SERVICE FOR PUBLIC UTILITY COMPANIES

A specially trained force of Frigidaire Sales Promotion men is constantly in touch with utility executives, and assisting in the preparation and carrying out of their sales plans. A letter will bring one of these men to you with full information. There will be no obligation whatever.

FRIGIDAIRE CORPORATION, SUBSIDIARY OF GENERAL MOTORS CORPORATION, DAYTON, OHIO

FRIGIDAIRE

NEW LOW PRICES NOW IN EFFECT

The

most important message in the history of the Electric Range Business

ELECTRIC range sales are now past the million mark—and only because women have found *electric* cookery infinitely better and easier.

This is significant, when we consider how small an effort has been made in the past to tell women about the advantages of electric cookery.

Now a tremendous sales and advertising program is inaugurated to tell the story to *every* woman. The industry goal is another million electric ranges in the next three years—*years of golden opportunity for those who hitch their selling efforts to this powerful program.*

Geo. A. Hughes
President

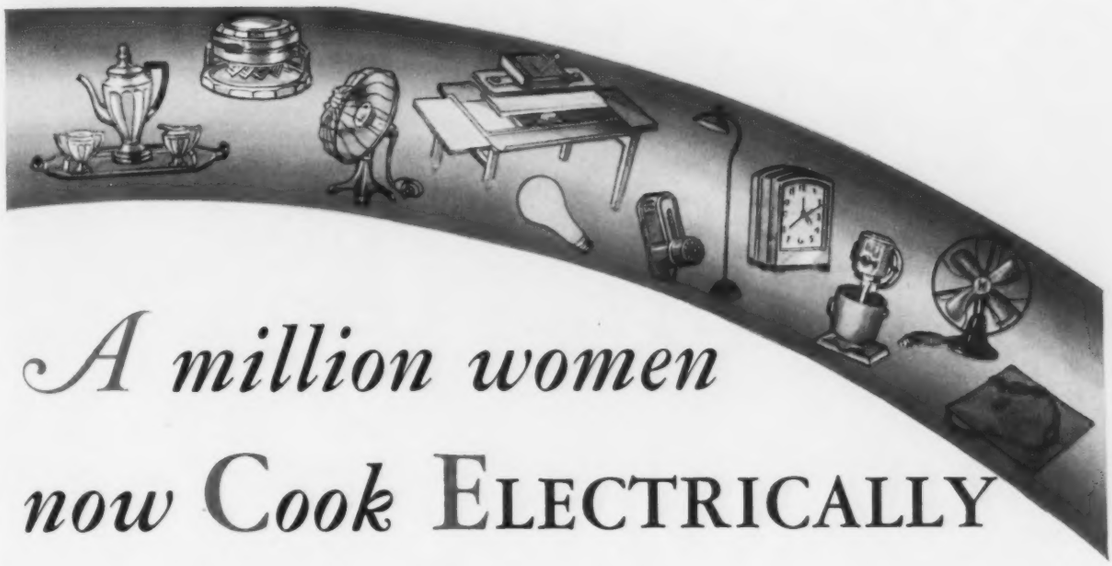
EDISON GENERAL ELECTRIC APPLIANCE CO., Inc.

Another member of a distinguished family
GE
On land and sea, in farm home and city apartment, hundreds of General Electric servants are lifting burdens, lengthening lives, making this world a better place in which to live. The flip of a finger now transforms night to day. A touch—and music floats through the ether into our homes. Over slender threads flows magic that makes cold—or heat—or that performs countless labor-saving tasks.
GENERAL
Hotpoint

THIS IS THE OPENING GUN

Advertising program includes such magazines as:

The Saturday Evening Post Liberty Collier's Better Homes & Gardens



A million women now Cook ELECTRICALLY

General Electric's new invention makes electric cookery easier, faster, more economical.

ALADDIN *dreamed* of magic. In our generation women have *real* magic at their finger tips.

In over a million American homes women are now cooking with a magic, modern heat that has no flame! At the flip of a switch flows heat which is as pure as concentrated sunshine. For the first time in history women have a *clean* heat, over which pans stay bright and new for years.

General Electric Hotpoint cooking does not require watching or basting. Complete meals cook themselves *automatically*—while the Mistress of Magic is *free* from her kitchen. The oven turns on while she is away, keeps at the right heat—and turns off again just before mealtime. It cooks with such perfect precision that cooking methods are now vastly simplified. Its so easy that even a child can bake beautiful, light, fluffy cakes.

A great General Electric invention, the Hi-Speed CALROD heating element, has made this magic heat faster than fuel. Yet it is so accurately *controlled* that a panful of potatoes is boiled in half an inch of water without burning.

General Electric has made this modern way to cook so economical that the average cost is *less than one cent a meal a person.*

This million dollar invention

of General Electric . . . the Hi-Speed CALROD electric heating unit . . . has made electric cookery even faster and more economical than ever before. It is sealed in steel—practically indestructible.

Electric Companies and dealers will be glad to show you models of General Electric Hotpoint ranges to meet every need, at prices to fit every purse. Or mail coupon for the book "The Story of Electric Cookery.

Edison General Electric Appliance Co., Inc.,
5600 West Taylor Street
Chicago, Ill.

Name.....

Street.....

City.....*State*.....

GE ELECTRIC

AUTOMATIC ELECTRIC RANGE

Good Housekeeping · Woman's Home Companion · Delineator
Ladies' Home Journal · McCall's Magazine · Country Gentleman
and other magazines

Leading newspapers everywhere. 53 *N. B. C. radio stations every week of the year*

400
Million Dollars
for the electrical industry

TO the utilities it will mean greatly increased use of electricity—and a million more homes with a deeper appreciation of the service which electricity renders.

To retailers of electrical equipment the program will bring an opportunity to cooperate wholeheartedly with the public utilities and to get a large share of the merchandise profit from the sale of a million ranges.

To electrical contractors, the profit from millions of dollars worth of wiring—and greatly stimulated employment.

And for other electrical manufacturers, employment for their people in the production of switches, wire, conduit and other necessary electrical service materials.

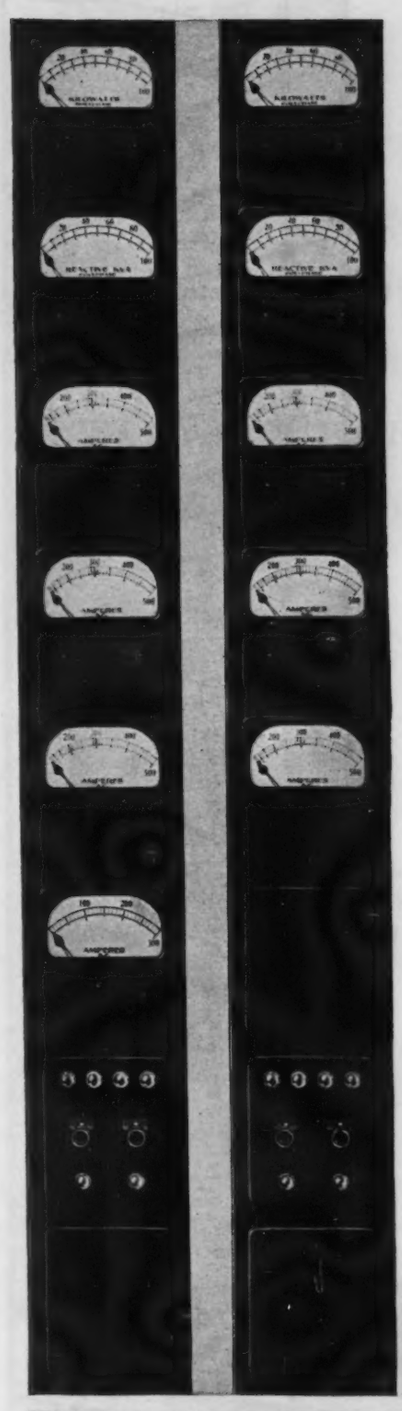
For complete information as to how *you* can identify yourself with this selling program, address

EDISON GENERAL ELECTRIC APPLIANCE CO., Inc.
5600 West Taylor Street, Chicago, Ill.

GENERAL ELECTRIC

Hotpoint

NEW



ACTUAL SIZE OF INSTRUMENT

WESTON MINIATURE CONTROL UNITS

featuring the new small size

WESTON RECTANGULAR INSTRUMENTS

● First shown at the N.E.L.A. Convention at Atlantic City, the new Weston Miniature Control Units using the new small size Weston Rectangular Instruments have met with instant and enthusiastic acceptance. They have been developed to meet the trend of modern switchboard design towards smaller control boards.

The Weston Miniature Control Units may be used with either A.C. or D.C. apparatus. They offer six outstanding advantages:—

1. More compact centralization of control — permitting a single operator to control a larger number of circuits.
2. Conservation of space.
3. Ease of assembling and connecting.
4. Flexibility of arrangement.
5. Ease of maintenance and repair.
6. Reduced installation cost.

The units consist of vertical steel racks of any required length, mounted with the desired instruments, a switch panel and a connecting panel. The unit assemblies are completely wired, ready to bolt together into a complete switchboard and connect to the external circuits. The units and all parts are standardized as to size and mounting and are interchangeable. Any combination of instruments and panels may be used.

Write for Illustrated Descriptive Folder WW

WESTON

ELECTRICAL INSTRUMENT CORPORATION

577 Frelinghuysen Avenue **Newark, N. J.**

PACIFIC COAST REPRESENTATIVES

Graybar Electric Co., Inc., 84 Marion St., Seattle, Wash.

J. H. Southard, San Francisco, Calif.

A. A. Barbera, Los Angeles, Calif.

Repair Service Laboratory, 683 Mission St., San Francisco, Calif.

INSTALLATIONS

easier
faster
more economical

GENERAL CABLE ARMORED SERVICE ENTRANCE CABLE

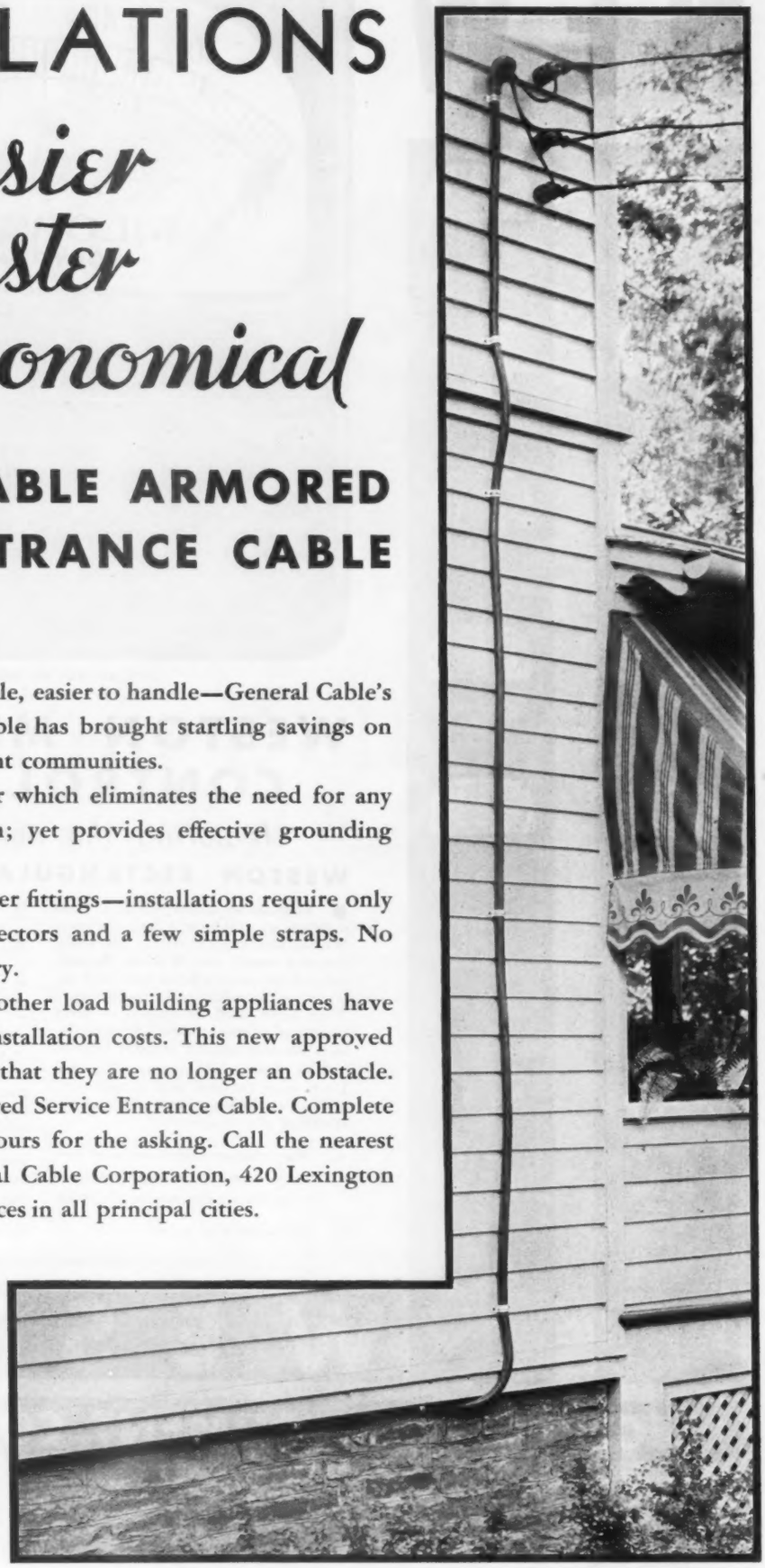
Lighter in weight, more flexible, easier to handle—General Cable's Armored Service Entrance Cable has brought startling savings on installations in many important communities.

It has its own metal armor which eliminates the need for any additional metallic protection; yet provides effective grounding throughout its length.

Lower material cost and fewer fittings—installations require only a weatherhead, squeeze connectors and a few simple straps. No threading or fitting is necessary.

Many sales of ranges and other load building appliances have been lost because of heavy installation costs. This new approved cable helps cut these costs so that they are no longer an obstacle.

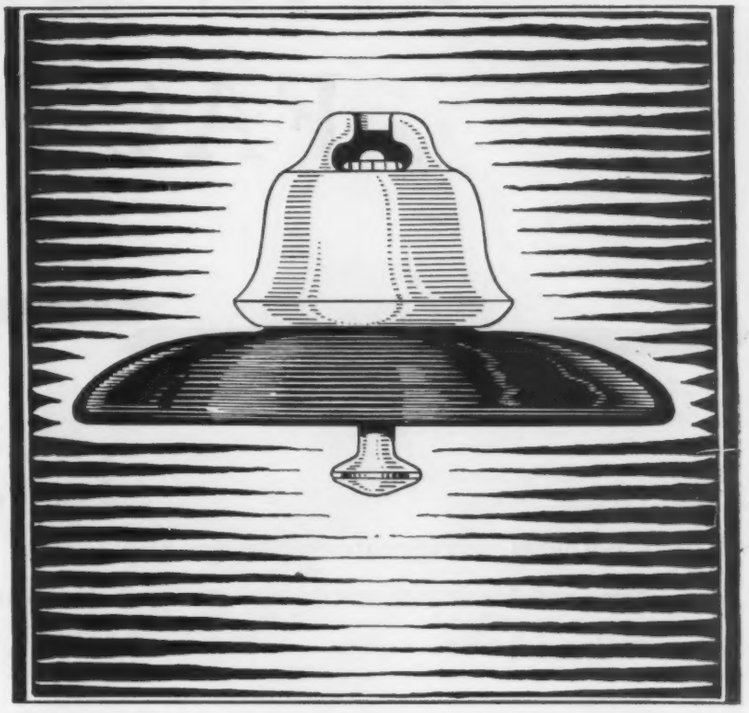
Get the facts on this Armored Service Entrance Cable. Complete literature and cost data are yours for the asking. Call the nearest district office or write General Cable Corporation, 420 Lexington Avenue, New York Citv. Offices in all principal cities.



GENERAL CABLE CORPORATION

"....and more than fifty percent

of all the insulators on the 220 kv transmission lines in this country today were designed and manufactured by Locke



The engineers who put in the first 220 kv line in the country knew that particular attention must be paid to the insulators. The high mechanical and electrical loads these would be called upon to carry made flawless insulators essential. They selected Locke Suspension Insulators as have the majority of engineers on similar developments since.

Of course, there is a reason for this. The design of Locke Suspension Insulators is the outcome of many years of practical experience both in the use of insulators and in their manufacture. The ruggedness necessary under modern conditions, the maximum strength and the long life have all been assured by the design. Locke Suspension Insulators of the same design as the ones being produced today have been in active service for over sixteen years without any record of failure. The arduous research, the constant improvement in processes, and the exact factory control have added further improvements. Today in the Locke Suspension Insulator you get not only greater resistance to breakage and higher mechanical strengths but you also get an insulator which by every known gauge is practically proof against deterioration.

Regardless of voltage, your own lines are of prime importance to you. If you have not already done so why not follow the example of the engineers who have been responsible for the construction and operation of the country's 220 kv systems and specify Locke Suspension Insulators?"

LOCKE PORCELAIN INSULATORS

GENERAL ELECTRIC SUPPLY CORPORATION., PACIFIC COAST DISTRIBUTOR

Cool, Clean FACTS

The major manufacturers of electrical refrigerators boosted their 1931 quotas 25 per cent, increased their advertising appropriations accordingly . . . and are making quota.

A leading manufacturer of electrical washing machines, who didn't trim sail and head for harbor when squally weather appeared on the 1931 horizon, reports a most substantial increase in sales over 1930.

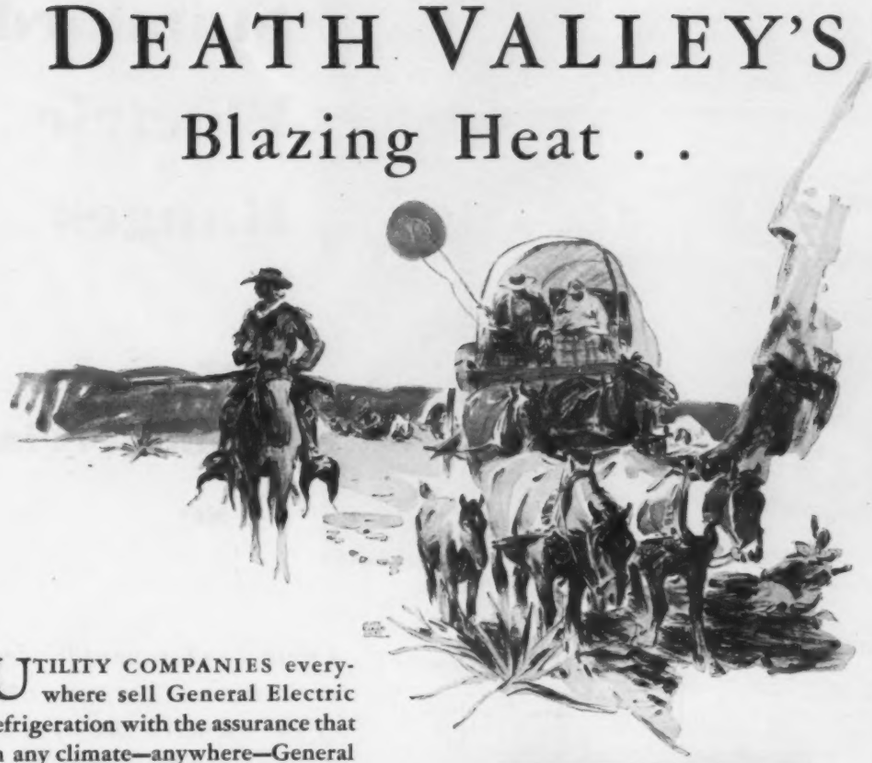
Cool, clean facts, these, for torrid days and possibly a too tepid attitude toward sales activities in general.

It can be done, if there is a will to do it . . . plus a plan.

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

General Electric Refrigeration DEFIES DEATH VALLEY'S Blazing Heat . .

INVEST IN AN ELECTRIC REFRIGERATOR



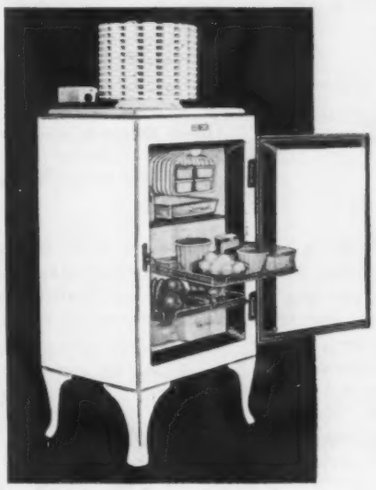
Performance sells the General Electric—performance keeps it sold. The famous Monitor Top is a symbol of perfected refrigeration to millions of Americans—the identifying mark of the Central Station's Super-Salesman—load builder and good-will winner supreme!

UTILITY COMPANIES everywhere sell General Electric refrigeration with the assurance that in any climate—anywhere—General Electric Refrigeration can be depended upon.

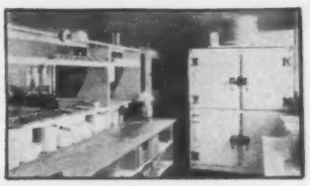
General Electric Refrigeration is an important factor in making summer life livable in the "hottest spot in America," where the average summer temperature is 122°. In Death Valley, California, Furnace Creek Inn, a resort hotel

Furnace Creek Inn, Death Valley, California

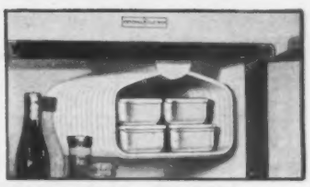
of luxurious comfort, keeps food fresh and tasty, drinking water always cool and refreshing, with seven General Electric Refrigerators and Water Coolers.



NEW SLIDING SHELVES
an exclusive General Electric feature



One of Furnace Creek Inn's General Electric Refrigerators



The General Electric Sanitary Super-Freezer—clean and easy to keep clean. Full porcelain surface; everything simple, efficient, sanitary

General Electric Company, Electric Refrigeration Department, Section DC7, Hanna Building, 1400 Euclid Ave., Cleveland, O.

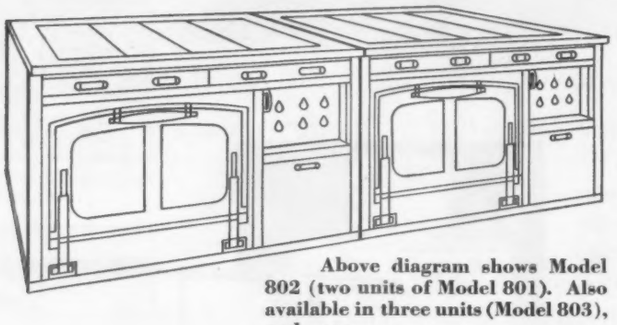
Join us in the General Electric Program, broadcast every Saturday evening, on a nation-wide N. B. C. network.

GENERAL ELECTRIC
ALL-STEEL REFRIGERATOR

DOMESTIC, APARTMENT HOUSE AND COMMERCIAL REFRIGERATORS · ELECTRIC WATER COOLERS

Standard Electric Ranges for Commercial Use

Standard Heavy-Duty Model 801 (Single Unit)



Above diagram shows Model 802 (two units of Model 801). Also available in three units (Model 803), and more.

A new development in electric ranges of extreme utility for all varieties of commercial and heavy-duty use. A range of utmost flexibility, permitting multiple-unit installations up to any cooking requirements.

Electrical cooking for hotels, restaurants, clubs, institutions, cafeterias, etc., is rapidly growing in favor. The advantages are outstanding. Greater accuracy, cleanliness, safety, convenience; improved air conditions in the kitchen; economy through reduced labor in cooking and cleaning; economy through food saving.

Standard is aware of this trend; has provided the ideal range for such heavy-duty requirements. The splendid Model 801 embodies time-tried Standard principles of heat application and thorough insulation.

The new Standard Catalogue gives full information on Heavy-Duty Series 801, 802 and 803, and on other heavy-duty Standards—as well as Standards for every cooking requirement—the most comprehensive of all lines of electrical cooking equipment.

Our spirit is one of cooperation in promoting added profitable business in the fast developing field of electrical cooking.

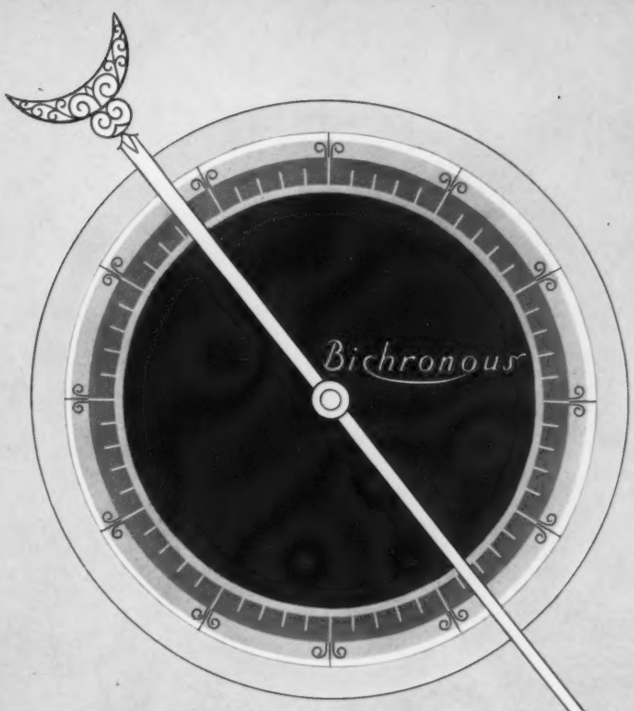
Standard
ELECTRIC RANGES

THE STANDARD ELECTRIC STOVE COMPANY, TOLEDO, OHIO

WM. P. SWARTZ, *Western Sales Representative, 629 South Serrano Avenue, Los Angeles*

LISTENWALTER & GOUGH, INC., *Distributors*

LOS ANGELES **SAN FRANCISCO**



SCOOP!

To make a product a little better than your competitors' best offering is an achievement.

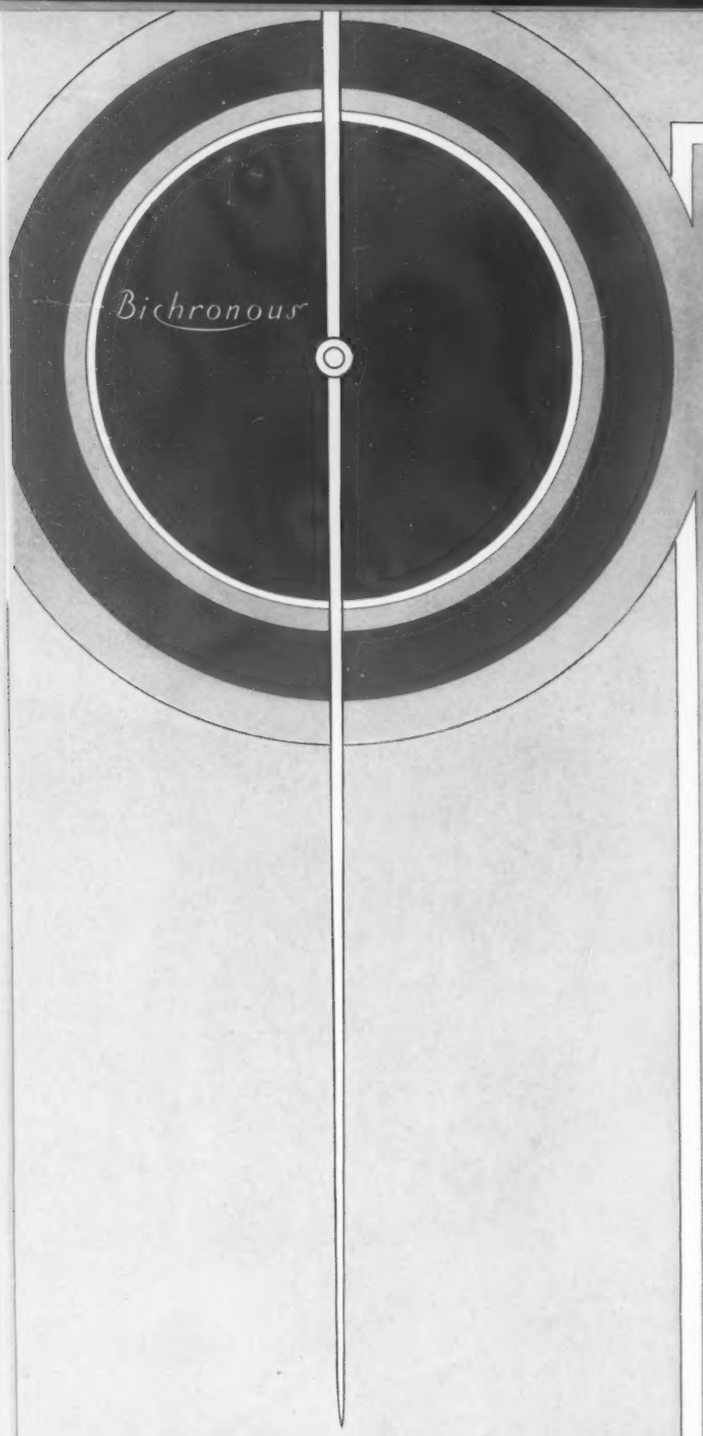
To make a product that stands so far above competition that there is no comparison is an industrial scoop that happens once in a lifetime.

Such is the Hammond clock with the Bichronous movement. It is a synchronous electric clock that continues to run through current interruptions.

The next three pages tell the story—

HAMMOND

BICHRONOUS AND SYNCHRONOUS ELECTRIC CLOCKS



HAMMOND

Bichronous

ELECTRIC CLOCKS
CONTINUE TO RUN
ACCURATELY THROUGH
CURRENT INTERRUPTIONS

HAMMOND SCOOPS

Introduces synchronous clocks that do not stop when current is interrupted. New clock is called Bichronous clock

It's the scoop of scoops—this time an improvement over the synchronous electric clock that will without question completely revolutionize the electric clock industry.

Everyone familiar with the synchronous clock knows that:

1. It is by far the best timekeeper available and the most convenient.
2. There is only one condition that can introduce an error into the otherwise perfect timekeeping of a synchronous clock—stoppages due to current interruptions.

Then, it follows that the ideal clock is one that has all the desirable qualities of the present manually started movement plus an auxiliary motor that keeps the clock running and tells accurate time during current interruptions. *This is exactly what we offer in the Hammond Bichronous clock*—in a variety of new models. It's a Hammond achievement!

PS THE ELECTRIC CLOCK INDUSTRY

AVONDALE CALENDAR CLOCK—*Tells day and date as well as exact time. Choice of special walnut color bakelite with satin gold finish dial or black bakelite with satin silver finish dial. Case 7 11/16" high; 4 13/16" wide; 3 1/8" deep. Retails at $16.50.*

COLUMBIA—*Solid mahogany case with matched veneer face. Modern design. Striped antique bronze, base satin ebony finish. Height 7 7/8", width 5 7/8", depth 3 5/16". Dial is satin gold finish, 3 1/2" in diameter. Retails at $17.50.*

ARCADIA—*Solid mahogany; face, special small-figured Carpathian Elm burl; top ornament Syroco; carving to match finish. Dial is etched satin silver finish, 3 1/2" in diameter. Over-all size 7 1/4" high; 5" wide; 3" deep. Retails at $14.50.*

GLENMORA—*A modern mantel clock design. Case 9 5/16" high; 7 7/8" wide; 3 1/2" deep. Has solid walnut face of selected Carpathian Elm burl. Base, solid walnut with wood inlay. Dial is satin gold finish, 5" in diameter. Retails at $25.00.*

SHERWOOD—*Solid mahogany body. Face, select redwood burl veneer; feet, antique bronze finish. Light buff 5" dial, case, 10" high; 8" wide; 3 7/8" deep. Retails at $27.50.*

HAWTHORNE—*Tambour style in Oriental striped matched mahogany veener; base of solid mahogany with carved moulding. Dial is etched satin gold finish, 5" in diameter; case 8 1/2" high; 19 1/2" wide; 3 9/16" deep. Retails $24.00.*

HOW IT WORKS AND WHAT IT DOES— BICHRONOUS MOVEMENT EXPLAINED

The Bichronous clock is the clock which will continue to run and tell correct time through current interruptions. When the current supply to the ordinary synchronous clock is interrupted the clock stops. The Bichronous clock does not—it has a reserve spring power which keeps it running—hence, "dual power."

The Bichronous clock operates on the synchronous principle when the current is on. It continues to run and keep its own time when the current is off. It should not be confused with an electrically wound clock which does not operate on the synchronous principle.

During current interruptions the motive power to drive the hands is supplied by a spring which is automatically wound. The device that regulates the speed at which the hands rotate is a new type of centrifugal governor. This mechanical governor is exclusively Hammond and is extremely accurate in its operation.

When the electric current is on, the power to drive the hands is derived from a small induction motor. The speed at which the hands rotate is regulated by a synchronous brake. The induction motor tries to run fast—the synchronous brake holds it back. The speed at which the synchronous brake revolves is determined entirely by the frequency of the current.

ELECTRICAL CHARACTERISTICS

A 60 cycle 110 volt Bichronous movement will operate on the synchronous principle from 80 to 140 volts.

From zero to 80 volts it is controlled by the mechanical governor.

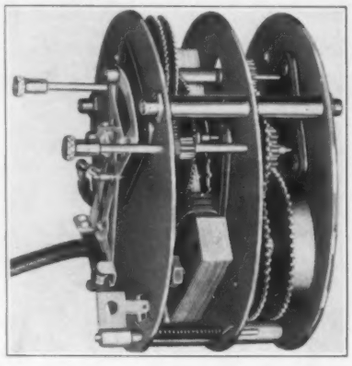
Variation in the frequency of the electric current will be followed by the movement from 60 up to 64 and down below 50 cycles. This gives the power company sufficient leeway so that master clock regulations can be made without causing the Bichronous movement to switch to its mechanical governor.

Variation in frequency beyond these limits will pass control to the governor.

MATERIALS USED IN BICHRONOUS MOVEMENT

The Bichronous movement is built to last a lifetime. The development of it is the result of a long period of intensive study of special materials best suited for the purpose. Non-magnetic stainless steel is used for the gears instead of brass. The pinions which run these gears are made of hardened carbon steel. All shafts on which power is transmitted are straight cylinders without shoulders or teeth, making it possible to use drill rod, which is heat treated and hardened to the limit. The surface is then ground on centerless grinders and polished to glass-like smoothness.

Exceedingly soft bearing material is used, resulting in a bearing of which one surface is perfectly smooth and extremely hard—the other surface soft and elastic. The bearings are self-lubricated and represent a development far in advance of anything used in the clockmaking art today.



For a more complete and detailed technical description with diagrams and photographs, send for a copy of the July issue of the *Hammond Times.*

The Hammond Clock Company, 2915 North Western Avenue, Chicago

HAMMOND

BICHRONOUS AND SYNCHRONOUS ELECTRIC CLOCKS

Frigidaire CAMPAIGNS

FIT SMOOTHLY INTO UTILITY PROGRAMS

In practically every case where utilities have put on Frigidaire sales campaigns and availed themselves of Frigidaire Individualized Sales Service, utility executives have told us that the regular routine work went on as usual without interruption.

Frigidaire Sales Service to utilities is so planned that very little time or work is needed on the part of utility personnel, either in the laying out or the execution of the campaign.

Frigidaire plans are complete in every detail. Everything is taken care of. And yet everything is made to fit perfectly into the established policies of the particular utility using the plan.

Frigidaire not only offers this unique sales service and a complete line of household electric refrigerators, but commercial equipment for every business that needs refrigeration. Such equipment includes water coolers, room coolers, and a long line of refrigeration units specially designed to efficiently meet every requirement.

We will be glad to send utility executives full details of Frigidaire's Individualized Sales Service and complete information regarding its products covering the entire field of refrigeration.

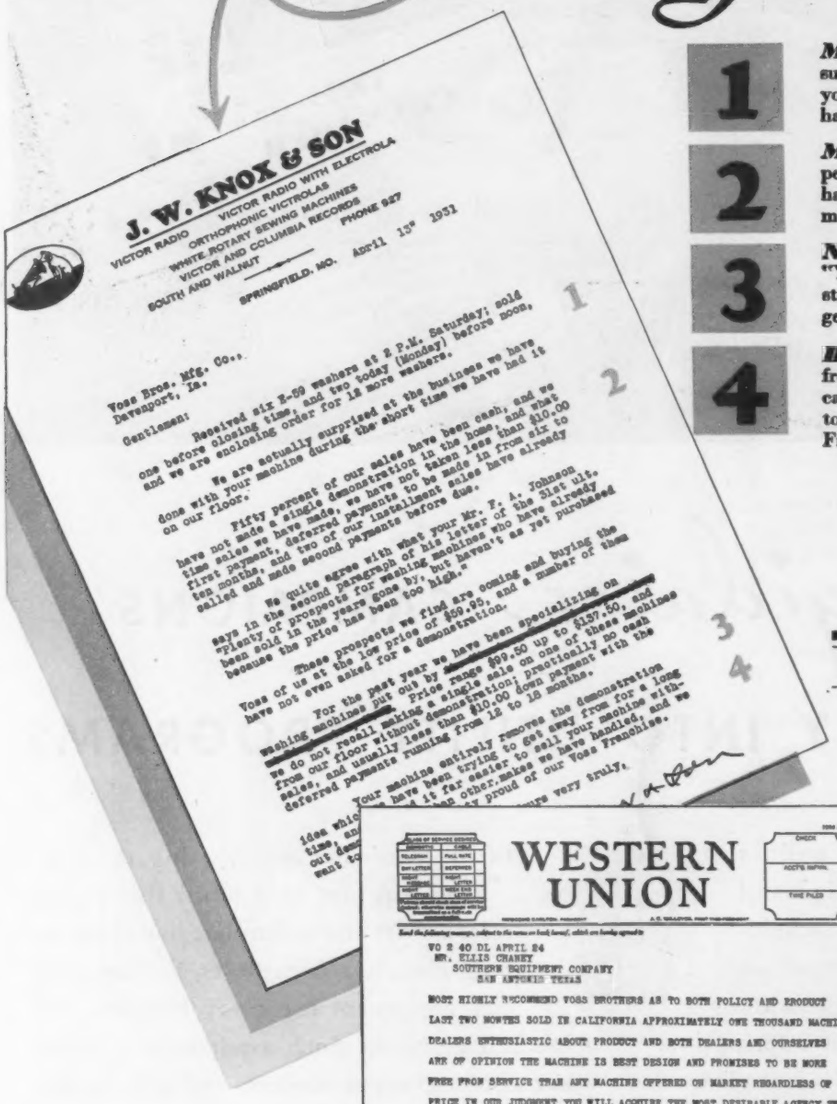
FRIGIDAIRE CORPORATION, SUBSIDIARY OF GENERAL MOTORS CORPORATION, DAYTON, OHIO

★ ★ ★ FRIGIDAIRE ★ ★ ★

A GENERAL MOTORS VALUE

★★★ A 5-YEAR COMPLETE GUARANTEE ★★★

Isn't this what you want,



J. W. KNOX & SON

VICTOR RADIO VICTOR RADIO WITH ELECTROLA
ORTHOPHONIC VICTROLAS
WHITE ROTARY SEWING MACHINES
VICTOR AND COLUMBIA RECORDS
SOUTH AND WALNUT PHONE 927

SPRINGFIELD, MO. April 13th 1931

Voss Bros. Mfg. Co.,
Davenport, Ia.

Gentlemen:

Received six E-69 washers at 2 P.M. Saturday; sold one before closing time, and two today (Monday) before noon, and we are enclosing order for 18 more washers.

We are actually surprised at the business we have done with your machine during the short time we have had it on our floor.

Fifty percent of our sales have been cash, and we have not made a single demonstration in the home, and what time sales we have made, we have not taken less than $10.00 first payment, deferred payments to be made in from six to ten months, and two of our installment sales have already called and made second payments before due.

We quite agree with what your Mr. F. A. Johnson says in the second paragraph of his letter of the 31st ult. relative to prospects for washing machines who have already been sold in the years gone by, but haven't as yet purchased because the price has been too high."

These prospects we find are coming and buying the washing machines we put out by demonstration.

For the past year we have been specializing on Voss or us at the low price of $69.95, and a number of them have not even asked for a demonstration.

Prior range $89.50 up to $137.50, and we do not recall making a single sale on one of these machines from our floor without demonstration; practically no cash sales, and usually less than $10.00 down payment with the deferred payments running from 12 to 18 months.

Your machine entirely removes the demonstration idea, which we have been trying to get away from for a long time, and it far easier to sell your machine without demonstration than any other make we have handled, and we are very proud of our Voss Franchise.

Yours very truly,

WESTERN UNION

VO 2 40 DL APRIL 24
MR. ELLIS CHANEY
SOUTHERN EQUIPMENT COMPANY
SAN ANTONIO TEXAS

MOST HIGHLY RECOMMEND VOSS BROTHERS AS TO BOTH POLICY AND PRODUCT LAST TWO MONTHS SOLD IN CALIFORNIA APPROXIMATELY ONE THOUSAND MACHINES DEALERS ENTHUSIASTIC ABOUT PRODUCT AND BOTH DEALERS AND OURSELVES ARE OF OPINION THE MACHINE IS BEST DESIGN AND PROMISES TO BE MORE FREE FROM SERVICE THAN ANY MACHINE OFFERED ON MARKET REGARDLESS OF PRICE IN OUR JUDGMENT YOU WILL ACQUIRE THE MOST DESIRABLE AGENCY THE WASHER MACHINE INDUSTRY HAS EVERY OFFER

H. B. HARRIS
LISTENWALTER AND GOUCH INC

THE QUICKEST, SUREST AND SAFEST WAY TO SEND MONEY IS BY TELEGRAPH OR CABLE

1 ***MORE SALES*** **. . . "We are actually surprised at the business we have done with your machine during the short time we have had it on our floor."**

2 ***MORE CASH SALES*** **. . . "Fifty per cent of our sales have been cash. . . . We have not taken less than $10.00 first payment."**

3 ***NO HOME DEMONSTRATIONS*** **"Your machine entirely removes the demonstration idea, which we have been trying to get away from for a long while."**

4 ***BIGGER NET PROFITS . . .*** **result from the three VOSS advantages listed above, causing our dealers to say . . . "We want to add, we are mighty proud of our VOSS Franchise."**

NOTE—All excerpts above are from the letter reproduced at the left. Read it!

VOSS
VOSS BROS. MFG. CO.
DAVENPORT, IOWA

The Only Washer At Any Price That Duplicates Hand-Washing Action.

When You Wash By Hand You Wash In The Suds at The Top.
The VOSS Agitator Washes In The Suds At The Top.
Dirt Always Falls To The Bottom.

Mail this coupon today

VOSS BROS. MFG. CO., E.W. 7-31
Davenport, Iowa

Gentlemen: Please give me details of the VOSS DEALER'S FRANCHISE for my territory.

Name.....

Address.....

.....

Voss Distributors

Listenwalter & Gough.....*Los Angeles*
Kaemper-Barrett Corp.....*San Francisco*
Northwest Voss Sales Co.....*Seattle*
Royal Electric Products Co.....*Portland*
Arizona Voss Sales Co.....*Phoenix*
Strevell-Paterson Hardware Co.,
.....*Salt Lake City*
Montana Distributors Inc.....*Great Falls*
C. H. Parker & Co.....*Denver*

Mr. Dealer?

The VOSS

$69.95

a phenomenal profit maker...

Sales volume . . . *and what volume* . . . is bringing VOSS Dealers the most profitable washing machine business they have ever experienced.

Dealers who for many years ordered only one machine at a time, are now ordering in six and twelve machine lots. And, frequently, they report that their entire order is sold from a single floor sample *before the shipment arrives!*

Larger dealers, too, are experiencing the same phenomenal demand, and we are shipping more car load lots than ever before in our 55 years as washing machine manufacturers.

More National Advertising!

VOSS has increased its national advertising. Larger space and more insertions than originally planned, will be used in The Ladies' Home Journal, Good Housekeeping and The Farmer's Wife during the rest of this year.

The VOSS has everything that thousands want!

It has *quality*, tested and approved by Good Housekeeping Institute, and guaranteed by the oldest manufacturers of washing machines. It has the only agitator that *duplicates hand-washing action*. It has a full-sized porcelain enamel tub. It has a genuine Lovell wringer and Westinghouse motor. It has all mechanism enclosed and running in oil. It has beauty of line and finish. *It has everything that thousands of thrifty buyers want.*

All this at the lowest price for which a washer of VOSS quality has ever been sold!

VOSS

VOSS BROS. MFG. CO.
DAVENPORT, IOWA

Now . . .
Two New Westinghouse
. . . IDEAL FOR THREE TO

SO great has the demand for WESTINGHOUSE refrigerators become that two entirely new *popular priced models* have been added to the line. This addition means that you have a *complete* line meeting every *possible* need and demand at prices for everyone.

Imagine a WESTINGHOUSE Refrigerator of 7.28 cubic feet capacity for only $240 f. o. b. factory! That's the model WL65. Model WL85 has a capacity of 8.98 cubic feet and is only $340 f. o. b. factory!

Both of these new models have all the basic *"Completely Balanced"* features which have given the WESTINGHOUSE Refrigerator its hourly increasing popularity! Consider the famous WESTINGHOUSE forced draft, hermetically sealed Quiet Mechanism, concealed in the flat usable Buffet Top, the Arm-High 7-Point Temperature Selector, the Automatic Built-In Watchman and the many other exclusive WESTINGHOUSE features. These new cabinets are of steel with sanitary porcelain lining.

A lifetime profit opportunity for enterprising dealers!

The overwhelming success of the WESTINGHOUSE Refrigerator has been literally astounding! All points in the country have indicated tremendous enthusiasm for this fine electric refrigerator backed by WESTINGHOUSE engineering talent!

MODEL WL65—*Beautiful steel cabinet, white lacquer with glistening porcelain lining for small family home or apartment. Capacity 7.28 cubic feet. Shelf area 11.40 square feet. Makes 11 pounds of ice or 96 ice cubes. Has hermetically-sealed, trouble-proof Quiet Mechanism; conveniently flat, usable Buffet-Top; Arm-high 7-speed Temperature Selector; Automatic Built-in Watchman and other* WESTINGHOUSE *"Completely Balanced" features.*

Westinghouse

THE NAME "WESTINGHOUSE" IS

Refrigerators at *popular prices*

SIX PERSON FAMILIES . . .

MODEL WL85—*The two-door type in this popular price group. Beautiful lines. Capacity* 8.98 *cubic feet. Shelf area* 14.10 *square feet. Makes* 11 *pounds of ice or* 96 *ice cubes at a time. A steel cabinet in glistening white lacquer . . . sanitary porcelain lining and all the other "Completely Balanced" features.*

Refrigerator YOUR GUARANTEE

And now, with the addition of these two new models, the WESTINGHOUSE Refrigerator franchise is more valuable than ever before. And back of it is a greatly increased national advertising campaign.

Increased National Advertising

Consider big double spreads and pages in color in the leading national publications. And more than that—literature of all descriptions, dealer helps galore, coöperative newspaper advertising, window displays, mat service and literally all manner of merchandising assistance to dealers!

Get full information now!

Write today for the details of the WESTINGHOUSE franchise. Get the true picture of its phenomenal success and see how you can share in its rewards for handling the *"Completely Balanced"* WESTINGHOUSE Refrigerator. Don't delay! Use the coupon or, better still, wire at once!

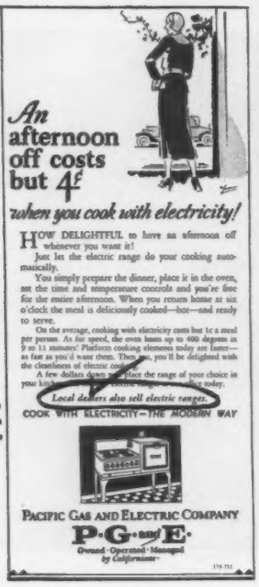
WESTINGHOUSE ELECTRIC
AND MANUFACTURING CO.
Merchandising Department
Mansfield, Ohio

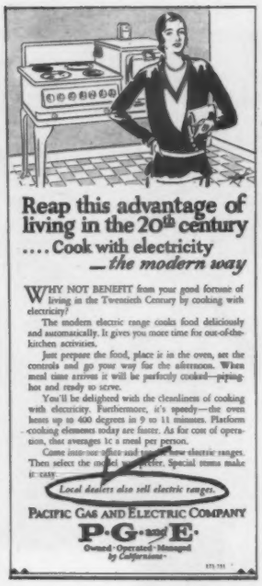
WESTINGHOUSE ELECTRIC
AND MANUFACTURING COMPANY,
Merchandising Department, Mansfield, Ohio

Please send me details of the WESTINGHOUSE Refrigerator Franchise.

*Name*_____

*Address*_____


An afternoon off costs but 4¢
when you cook with electricity!
HOW DELIGHTFUL to have an afternoon off whenever you want it!
Just let the electric range do your cooking automatically.
You simply prepare the dinner, place it in the oven, set the time and temperature controls and you're free for the entire afternoon. When you return home at six o'clock the meal is deliciously cooked—hot—and ready to serve.
On the average, cooking with electricity costs but 1¢ a meal per person. As for speed, the oven heats up to 400 degrees in 9 to 11 minutes. Platform cooking elements today are faster—as fast as you'd want them. Then, too, you'll be delighted with the cleanliness of electric cooking.
A few dollars down will place the range of your choice in your kitchen. Come in today.
Local dealers also sell electric ranges.
COOK WITH ELECTRICITY—THE MODERN WAY
PACIFIC GAS AND ELECTRIC COMPANY
P·G·and E·
Owned·Operated·Managed by Californians·


Reap this advantage of living in the 20th century
....Cook with electricity
—the modern way
WHY NOT BENEFIT from your good fortune of living in the Twentieth Century by cooking with electricity?
The modern electric range cooks food deliciously and automatically. It gives you more time for out-of-the-kitchen activities.
Just prepare the food, place it in the oven, set the controls and go your way for the afternoon. When meal time arrives it will be perfectly cooked—piping hot and ready to serve.
You'll be delighted with the cleanliness of cooking with electricity. Furthermore, it's speedy—the oven heats up to 400 degrees in 9 to 11 minutes. Platform cooking elements today are faster. As for cost of operation, that averages 1¢ a meal per person.
Come into our office and see the new electric ranges. Then select the model you prefer. Special terms make it easy.
Local dealers also sell electric ranges.
PACIFIC GAS AND ELECTRIC COMPANY
P·G·and E·
Owned·Operated·Managed by Californians·

Reproduced here, in small size, are two P. G. and E. advertisements with which dealers may tie-in during the month of July.

DEALERS!

—are you getting your share of this great APPLIANCE MARKET?

AT THE beginning of this year, Pacific Gas and Electric Company made an estimate of the electric appliance market which would be created for dealers. The estimate is as follows:

Electric appliances	$21,483,000
Value of wiring material incident thereto	$ 2,457,000
Total estimated market	$23,940,000

Organized effort by the entire industry—utility, appliance manufacturers, jobbers and dealers—is essential, however, if the maximum amount of business is to accrue to each group through creation of consumer acceptance of electric appliances. Accordingly, Pacific Gas and Electric Company is creating this consumer acceptance and new prospects by intensive advertising throughout the year.

During the month of July, P. G. and E. advertising will *sell* the advantages of using an electric range and will continue to direct prospects to dealers' stores. You can get your share of this forthcoming market by running your own advertisement beside ours . . . telling these new prospects WHERE they may buy electric ranges.

Your local newspaper offices will be glad to give you the exact publication dates of P. G. and E. advertisements; call them each week or at any time you wish to direct prospects to your store with tie-in advertising.

PACIFIC GAS AND ELECTRIC COMPANY

P·G·and E·

Owned·Operated·Managed by Californians·

176-731 EW

SERVICE COSTS REDUCED—Chromalox Units have been in use on electric ranges since 1924. Thousands of these units are the very same original units which equipped the electric ranges when they were first purchased. Patented embedded type construction and other exclusive Chromalox features insure this unusually long operating life, with original heating qualities.

MODERNIZE ANY RANGE—Actual photograph shows how Chromalox Super-Speed Units provide smooth, flat, full-element-area cooking top. Result: perfect metal-to-metal contact with pots and pans; real cooking speed, efficiency and economy.

MAKE EVERY RANGE OWNER A SATISFIED RANGE USER

Now you can definitely do it—easily, quickly. With a size to fit every make of electric range in use, Chromalox Super-Speed replacement units enable you to make every range owner, a satisfied range user—a real booster for electric cooking. SPEEDY, DURABLE, LONG-LIVED, these EASILY-INSTALLED Chromalox Super-Speed replacement units solve the problem of maintaining load on lines and reducing service costs among your range users.

MODERNIZE ANY RANGE IN 15 MINUTES. Simply take out old element, slip in and connect a Chromalox Super-Speed Unit. No fuss or muss.

QUICK SHIPMENTS—A SIZE FOR EVERY RANGE. Prompt shipments enable you to give range users quick service. Get in touch with nearest Chromalox representative for complete sales data, prices, quantity discounts, etc.

CHROMALOX UNITS KEEP RANGE CUSTOMERS SATISFIED BECAUSE—

Chromalox Super-Speed Range Units combine all of the good points of both previous open and closed type units: (1) Reasonably Priced. (2) Easily Installed—no fuss or muss. (3) Heat Faster, More Efficiently, More Economically—use less kilowatt hours. (4) Operate at Visible Red Heat. (5) Smooth, Flat Top—chromium alloy heating surface. Direct contact between utensil and heating element increases cooking efficiency. (6) Fully Enclosed*Heating Elements protect operator. Shock-proof—no exposed wires. (7) Strong, Durable, Long-Lived—maintain original heating efficiency. (8) Withstand daily wear and tear Pots and pans cannot damage units (9) Safe—each heating element can be individually grounded. (10) Easily Cleaned—bright chromium reflector.

*Resistor wire is embedded in refractory material under hydraulic pressure, baked at red heat.

By test... FASTER, MORE EFFICIENT AND ECONOMICAL THAN ANY UNITS OF EQUAL RATING

. . . . . MAIL THIS COUPON WITH YOUR LETTERHEAD . . . . .

To Edwin L. Wiegand Co., 7540 Thomas Blvd., Pittsburgh, Penna.

The Electric Material Co., Inc., 163 Second St., SAN FRANCISCO, CAL., or 912 E. Third St., LOS ANGELES, CAL. Harrison Sales Co., 314 Ninth Ave., N., SEATTLE, WASH.

Please send us complete data about Chromalox Super-Speed Range Units including prices, quantity discounts, sales helps, window display, etc.
Also ship immediately and charge to our account, the following units less 30% discount.

_____1000-watt units to fit (Model and Make of Range)_____ @ $6.90 each

_____1200-watt units to fit (Model and Make of Range)_____ @ 8.00 each

_____1500-watt units to fit (Model and Make of Range)_____ @ 8.30 each

_____2000-watt units to fit (Model and Make of Range)_____ @ 8.75 each

Signed_____ Position_____

Please Check ☐ Dealer ☐ Contractor-Dealer ☐ Jobber ☐ Power Company

Mother *and* Father *didn't miss a word*

From their seats in the last row of the school auditorium would they be able to hear their little girl recite? The parents were pleasantly surprised when her childlike treble came across the distance clear and natural, brought by Western Electric amplifying apparatus.

Public Address Systems widen the hearing circle. They enable hundreds or many thousands, indoors and out, to hear distinctly every word of a speaker or the pianissimo tone of a musical instrument.

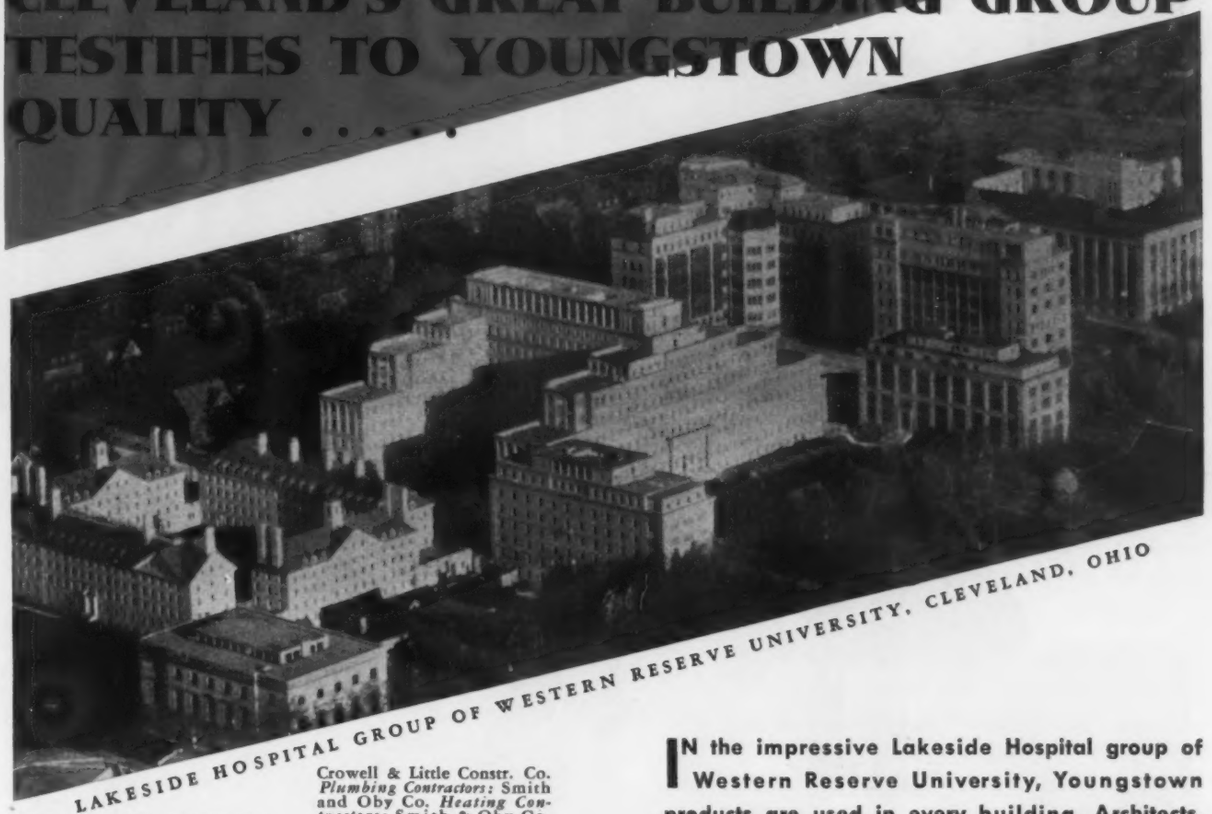
This equipment gives its true-to-life tonal results because it was made by an organization with fifty years' experience in *sound*—the makers of your Bell telephone. It is additional proof—along with apparatus for talking pictures, for broadcasting, for police radio, for aviation communication—of Western Electric leadership in the whole field of sound.

Western Electric

Makers of your Bell telephone and leaders in the development of sound transmission

The Western Electric Public Address System is distributed by Graybar Electric Company.

CLEVELAND'S GREAT BUILDING GROUP TESTIFIES TO YOUNGSTOWN QUALITY . . . . .



LAKESIDE HOSPITAL GROUP OF WESTERN RESERVE UNIVERSITY, CLEVELAND, OHIO

LAKESIDE HOSPITAL GROUP

Service Building:
Architects: Garfield Stanley-Brown Harris and Robinson. *Engineer:* John Paul Jones. *General Contractors:* Lundoff Bicknell Co. *Plumbing Contractors:* W. G. Cornell Co. *Heating Contractors:* W. B. Van Sickle Co. *Electrical Contractors:* Hatfield Electric Co. *Ventilating Contractors:* W. B. Van Sickle Co.

Medical School:
Architects: Coolidge, Shepley, Bulfinch and Abbott, Boston, Mass. *Engineers: Heating and Ventilating:* Buerkel & Co., Boston, Mass. *Plumbing:* James A. Cotter Co., Boston, Mass. *General Contractors:* Lundoff Bicknell Co. *Plumbing Contractor:* Smith & Oby Co. *Heating Contractors:* A. R. Brueggeman Co. *Electrical Contractors:* The Berg Clark Electric Co. *Ventilating Contractors:* A. R. Brueggeman Co.

Babies' Hospital:
Architects: Garfield Stanley-Brown Harris and Robinson. *Engineers: Heating and Ventilating:* Buerkel & Co., Boston. *Plumbing:* James A. Cotter Co., Boston, Mass. *Electrical:* Hixon Electrical Co. *General Contractors;* John Gill & Sons. *Plumbing Contractors:* Smith & Oby Co. *Heating Contractors:* A. R. Brueggeman Co. *Electrical Contractors:* Hatfield Electric Co. *Ventilating Contractors:* A. R. Brueggeman Co.

Maternity Hospital:
Architects: Garfield Stanley-Brown Harris and Robinson. *Engineers:* Clark MacMullen and Riley. *General Contractors:* Crowell & Little Constr. Co. *Plumbing Contractors:* Smith & Oby Co. *Heating Contractors:* A. R. Brueggeman Co. *Electrical Contractors:* Hatfield Electric Co. *Ventilating Contractors:* A. R. Brueggeman Co.

Pathology Building:
Architects: Garfield Stanley-Brown Harris and Robinson. *Engineers:* Clark MacMullen & Riley. *General Contractors:* Crowell & Little Constr. Co. *Plumbing Contractors:* Smith and Oby Co. *Heating Contractors:* Smith & Oby Co. *Electrical Contractors:* Hatfield Electric Co. *Ventilating Contractors:* Smith & Oby Co.

Lakeside Hospital:
Architects: Coolidge, Shepley, Bulfinch & Abbott. Boston, Mass. *Engineers: Heating and Ventilating:* Buerkel & Co., Boston. *Plumbing:* Jas. A. Cotter Co., Boston. *Electrical:* Hixon Elec. Co. *General Contractors;* John Gill & Sons. *Plumbing Contractors:* W. G. Cornell Co. *Heating Contractors:* W. B. Van Sickle Co. *Electrical Contractors:* Martien Electric Co. *Ventilating Contractors:* W. B. Van Sickle Co.

Hanna Memorial Building:
Architects: Coolidge, Shepley, Bulfinch and Abbott, Boston, Mass. *Engineers: Heating and Ventilating:* Buerkel & Co., Boston, Mass. *Plumbing:* James A. Cotter Co., Boston, Mass. *General Contractors:* John Gill & Sons, *Plumbing Contractors:* W. G. Cornell Co. *Heating Contractors:* W. B. Van Sickle Co. *Electrical Contractors:* Martien Electric Co. *Ventilating Contractors:* W. B. Van Sickle Co.

Nurses' Dormitory:
Architects: Coolidge, Shepley, Bulfinch & Abbott, Boston, Mass. *Engineers: Heating and Ventilating:* Buerkel & Co., Boston, Mass. *Plumbing:* Jas. A. Cotter Co., Boston, Mass. *Electrical:* Hixon Elec. Co. *General Contractors:* John Gill & Sons. *Plumbing Contractors:* W. G. Cornell Co. *Heating Contractors:* W. B. Van Sickle Co. *Electrical Contractors:* Martien Electric Co. *Ventilating Contractors:* W. B. Van Sickle Co.

Allen Memorial Library:
Architects: Walker & Weeks. *Engineers: Heating and Ventilating:* Clark MacMullen & Riley *Plumbing:* Walker & Weeks. C. H. Loughridge. *General Contractors:* Reaugh Constr. Co. *Plumbing Contractors:* Smith & Oby Co. *Heating Contractors:* Smith & Oby Co. *Electrical Contractors:* Martien Electric Co. *Ventilating Contractors:* Smith & Oby Company.

IN the impressive Lakeside Hospital group of Western Reserve University, Youngstown products are used in every building. Architects, engineers and contractors on all of these buildings have recognized the superior qualities of Youngstown pipe, Youngstown Buckeye Conduit and Youngstown steel sheets, all of which have been used in this new university group. / Electrical contractors the country over recognize the merits of Youngstown Buckeye Conduit . . . . and use it consistently. / Youngstown products are handled by leading jobbers everywhere.

THE YOUNGSTOWN SHEET & TUBE CO.

One of the oldest manufacturers of copper-steel, under the well-known and established trade name "Copperoid"

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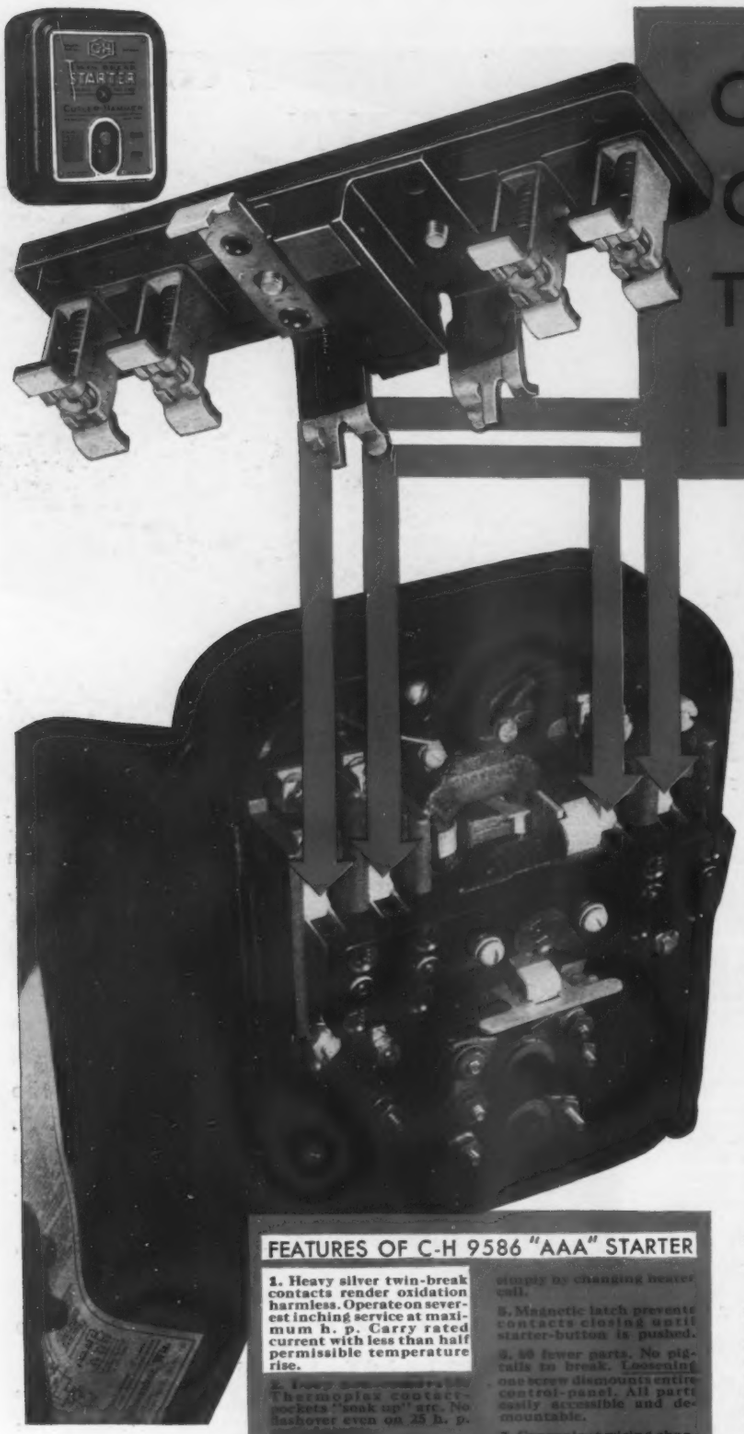
ST. LOUIS . . . Louderman Bldg.
YOUNGSTOWN . . Stambaugh Building
LONDON REPRESENTATIVE
The Youngstown Steel Products Company, Dashwood House, Old Broad Street, London, E. C. Eng.

YOUNGSTOWN

GALVANIZED SHEETS PROTECT · SAVE WITH STEEL



CUTTING CONTACT TROUBLES IN TWO

HEAVY arcing, oxidation, and burning of contacts—all the troubles that affect ordinary single-break starters—are well guarded against in the C-H 9586 "AAA" Twin-Break Starter. All contacts are twin-break, cutting the voltage rise in two. The remaining pin-point arc is snuffed out in the deep non-removable thermoplax pockets. The eight contacts are not merely plated but actually are "shod" with blocks of pure silver which carry full current continuously, even on severe inching service, with little temperature rise.

With such a starter, the motor and machine are driven to the highest pitch of production, yet this starter infallibly guards against dangerous overloads, performance which is even more understandable after a study of the eight individual Twin-Break Starter features listed below—performance which is typical of the entire C-H Starter line.

Install C-H Control on your equipment; ask for it on the motorized machines you buy. Electrical wholesalers in principal cities stock C-H Control. CUTLER-HAMMER, Inc., *Pioneer Manufacturers of Electric Control Apparatus.* 1278 St. Paul Ave., Milwaukee, Wis.

FEATURES OF C-H 9586 "AAA" STARTER

1. Heavy silver twin-break contacts render oxidation harmless. Operate on severest inching service at maximum h. p. Carry rated current with less than half permissible temperature rise.

2. [illegible] Thermoplax contact-sockets "snuk up" arc. No flashover even on 25 h. p.

3. Twin-break contacts halve arc voltage.

4. C-H Overload Relay [illegible] ...ides absolute protection ... maximum production. Changes for current-rating [illegible] simply by changing heater coil.

5. Magnetic latch prevents contacts closing until starter-button is pushed.

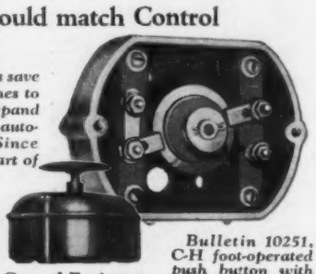
6. 50 fewer parts. No pigtails to break. Loosening one screw dismounts entire control-panel. All parts easily accessible and demountable.

7. Convenient wiring channel between case and control panel. All leads brought in top or bottom.

8. Minimum of current-carrying joints. Low contact resistance. Low voltage drop.

Accessories should match Control —in Quality

Control Accessories save steps, permit machines to be run faster, often expand the possibilities of automatic operation. Since they are so vital a part of the motorized machine, select them with the utmost care. Specify Cutler-Hammer Control Accessories ... designed by Control Engineers to function supremely well with good motors and good Control.



Bulletin 10251, C-H foot-operated push button with normally closed or normally open contacts.

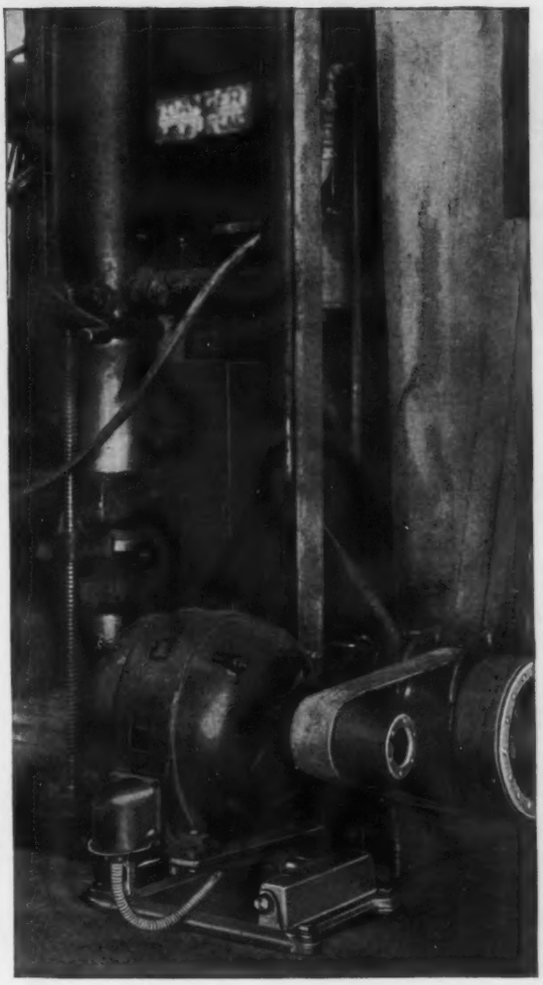
CUTLER HAMMER

C-H

The Control Equipment Good Electric Motors Deserve

(A-4149)

560 S. San Pedro St., Los Angeles — 970 Folsom St., San Francisco — 2207 First Ave., So., Seattle



The Drive

THAT REQUIRES NO "CODDLING"

● Here's a short center drive that goes to work and stays at work!

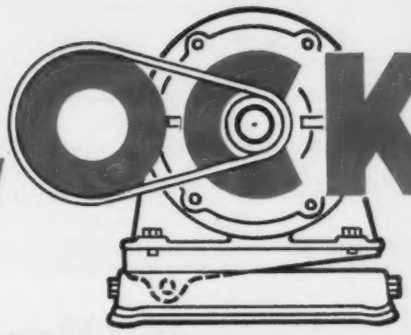
Tighten four bolts and the motor is mounted; four more bolts and the base is in place. Quick, simple adjustment for pulley alignment. Turn on the current and the drive is at work!

Once in service, it gives steady, dependable performance, month after month and year after year, with scarcely a moment's attention. Uniform belt tension—constant speed—constant pull! Clean, quiet, efficient.

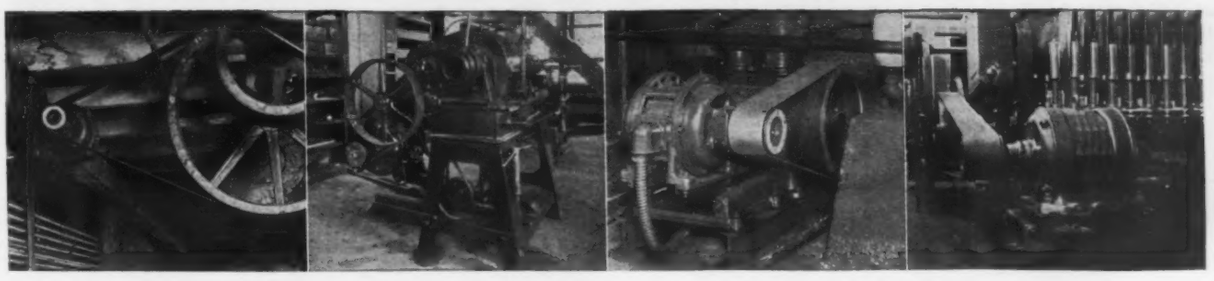
You can get immediate delivery on standard Rockwood Drives for motors from 1 to 50 H. P. —any center-distance desired. Larger sizes, and special mountings for machinery builders, made promptly to order.

Specification and Size Book J-31 gives complete information and prices. Write today for your free copy!

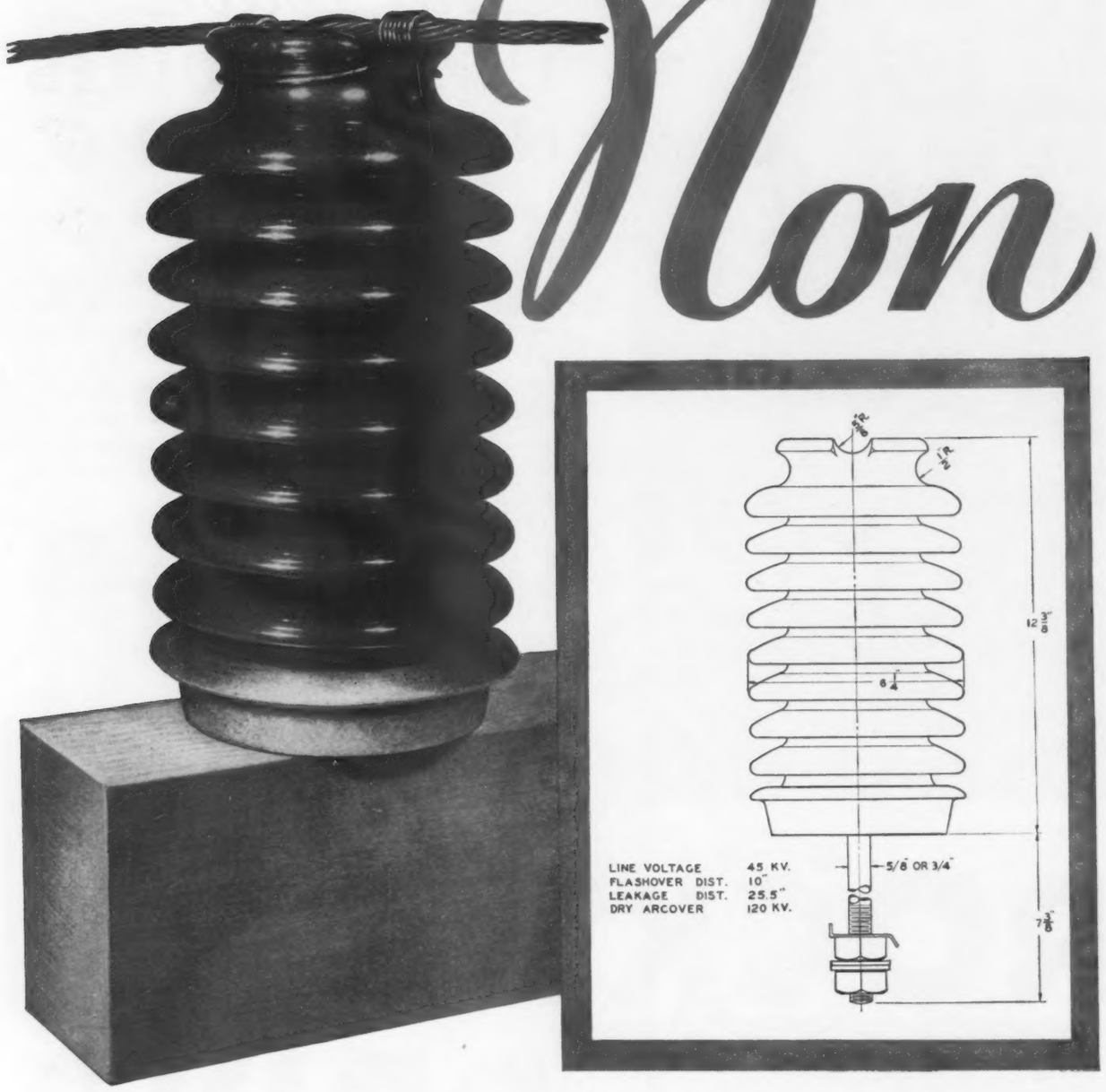
THE ROCKWOOD MANUFACTURING CO., *Indianapolis, Ind.*
THE OHIO VALLEY PULLEY WORKS, INC., *Maysville, Ky.*
Divisions of General Fibre Products, Inc.



ROCKWOOD SHORT-CENTER FLAT BELT DRIVE



Non



Radio Engineer of Large Power Company Reports:

"We were able to impress approximately 60,000 volts across the insulator before corona appeared on the conductor and tie wire. At this point interference started in but no corona was audible on the insulator up to 75,000 volts to ground. We can state definitely from our tests today that interference does not appear 60 KV to ground and it is probable that the critical point is higher.

"From a radio interference standpoint this insulator seems to be approximately 75% better than any other type which we have tested . . . I believe that serious consideration should be given for standard construction. All the rest of the ordinary pin type insulators have been treated with a view to raising the critical voltage point but this type seems to have gotten at the root of the whole trouble by greatly reducing the capacity of the unit and by making solid contact between the pin assembly and the porcelain."

Compare these figures with the 7 and 10 KV at which radio interference starts on most conventional pin insulators.

Static...

LAPP *Line-Post* Insulator No. 8052

THIS new Lapp *Line-Post* Insulator solves the problem of radio interference due to insulators. And without resorting to superficial attachments, coatings or treatments which tend towards deterioration—or even sometimes aggravate the trouble. The improvement lies in the design.

Terminals placed far apart minimize electrostatic capacity. With low capacitance, the charging current flux through air, particularly around the line terminal, is reduced below the critical point.

This wide spacing is made possible by eliminating the pin, which in the Lapp *Line-Post* Insulator is replaced by a cemented metal base of sufficient area to diffuse the accompanying flux at low intensity. How effective this new insulator has proved in test is indicated in the letter on the preceding page.

Mechanical Superiority—Short thick flanges reenforce and protect a porcelain body of exceptional solidity. We believe these units impervious to stones or lead rifle bullets. Even a steel-jacketed bullet might only rip off a portion of one petticoat, but do little damage to the insulator's electrical characteristics. The wide open shells of a standard insulator, especially vulnerable to direct hits from below, are eliminated in this design—the bottom protected by the projecting splash lip of the metal base.

Stability Under Arcover—Compared to standard units the *Line-Post* presents little or no area at the top where conventional pin-type insulators are exposed to cracking under localized heat. The bottom is free from broad flanges into which an arc might rise with destructive burning. Even if the relays should not open, the Lapp *Line-Post* Insulator should outlast the conductor. The heavy metal splash lip at base provides a smooth rounded terminal for electrostatic requirements plus ample metal for resisting burning under power arcover. This insulator will remain crack-free in normal service and puncture-proof under any circumstances.

Excess Strength—The better pins used today are rated at 3000# with a 10° deflection. Tests show that the *Line-Post* stands well in excess of 3000# with practically no deflection.

Stresses Obviated—Under cantilever load any insulator mounted on a metal pin has within the pin-hole severe bursting pressures. In the *Line-Post* a much more favorable loading is secured; the metal base aids the porcelain by supporting it *outside* with a low-intensity compression grip.

Combats Dirt, Contamination—Adherence to the proved Lapp Fog Type design gives the *Line-Post* excellent behavior under dirt or contaminated atmospheric conditions. Absence of partly-dry high resistance shielded leakage surfaces in series with wetted exposed external surfaces makes possible for the first time in a line insulator a completely wetted, electrically quiet, leakage path. The splash lip on the base wets the lowest corrugation underneath (as the others wet those above them) eliminating the last chance of an arc-sputter over a dry spot which would cause radio interference.

Write for sample and details

PACIFIC COAST DISTRIBUTERS

MAYDWELL & HARTZELL
INCORPORATED

LOS ANGELES SAN FRANCISCO SEATTLE

LAPP INSULATORS

Safe because it is dependable

And Forgings are Dependable

Mr. Consumer rides on an elevator, probably never giving thought to the selection of metals that are making it safe for him. Mr. Consumer uses the electricity in his home, probably never giving thought to the materials that are giving him that service. But let the elevator fall, or let the service be interrupted and he is "Johnny on the spot" to tell the world what he thinks of the man who specified that material.

In the case of the elevator there are lives at stake and nothing but the best goes into its construction. The men who build it demand an added margin of safety. They want to be sure.

Do you demand this added margin in your specifications? If you are looking for every possible safeguard to interruption, specify BTC drop-forged caps for your high-tension suspension insulators. They are an added margin of safety, for they are uniform, strong, accurate and anti-corrosive. Investigate them, then demand this extra protection.

THE BREWER-TITCHENER CORPORATION
Cortland, N. Y.

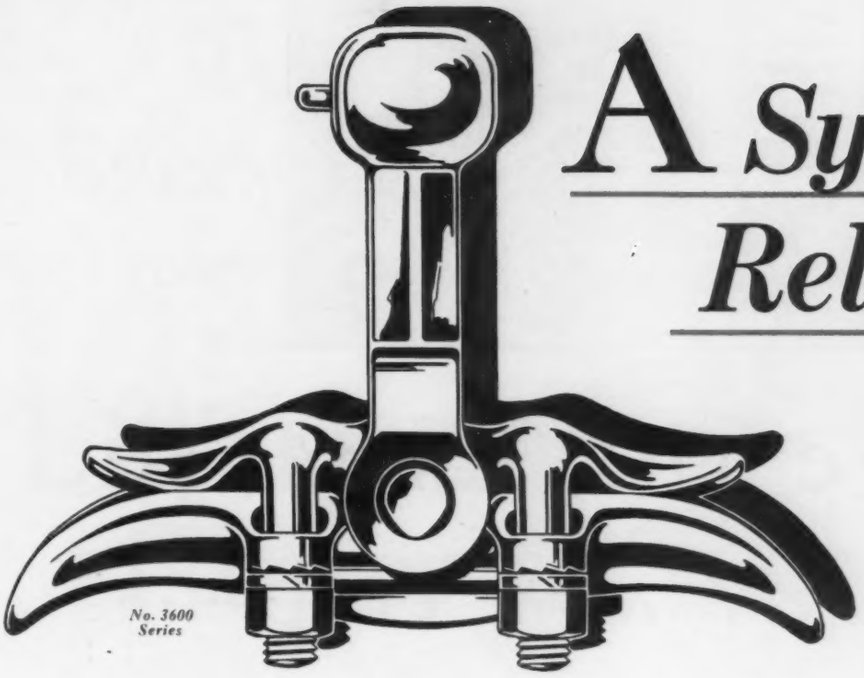
Why a Drop Forged Cap?

1. They are uniform in quality.
2. They are superior in strength.
3. They are uniform in dimensions.
4. They can be heat treated to give maximum strength with minimum weight.
5. They have precision milled joints and drilled holes.
6. They are free from hidden defects and concealed flaws.
7. They give extra protection to your lines.

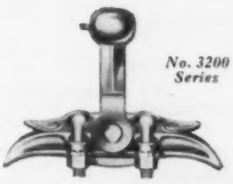
Drop Forgers to the Electrical Industry

ASK YOUR INSULATOR MANUFACTURER

A Symbol of Reliability



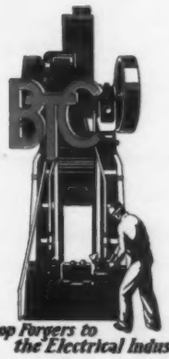
No. 3600 Series



No. 3200 Series

No. 2200 Series

No. 4000 Series



Drop Forgers to the Electrical Industry

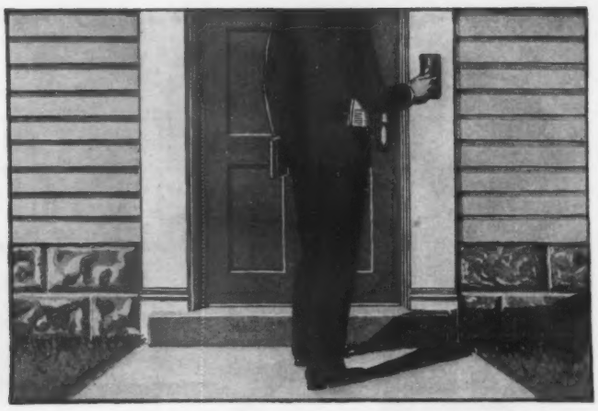
B. T. C. Drop Forged

Drop forged, heavy duty trunnion type, suspension clamp No. 3600; forged from copper-bearing steel and hot dip galvanized. That would describe the BTC clamp above. Catalog copy would further tell you that the U bolt was forged integral with the keeper and factory assembled to the trunnion yoke, thus effecting a minimum of loose parts. There are no sharp corners to induce corona and all fitting parts are machined to the finest degree of accuracy. But we will leave these catalog details for further investigation.

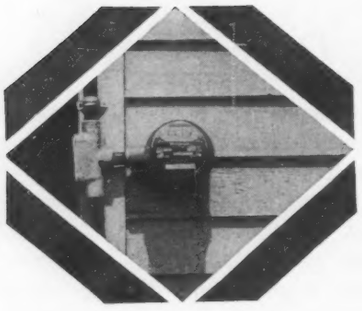
Consider this full line of drop forged clamps, uniform and reliable, offering the finest grade of metal work. They are BTC products and come up to the high standards established for all BTC forgings. Send for the catalog giving full detail on every clamp with a table of slip strengths. These clamps can be purchased from your own insulator manufacturer.

THE BREWER-TITCHENER CORPORATION
Cortland, N. Y.

ASK YOUR INSULATOR MANUFACTURER



Save the Expense of a *return* trip · · ·



THE meterman rings the bell—once—twice. Then he waits. Again he tries in vain to summon someone to the door. Another "missed reading" that will cost a return trip, a trip that more than doubles the time required to get the reading.

Save the expense of return trips by installing Detachable OB Meters—*outdoors.* These meters are built for outdoor service. Rain, snow, dust, cold, or heat cannot hurt them or affect their accuracy.

For complete information about the detachable meter, write our sales office near you. Our Meter Specialist there, also, is at your service.

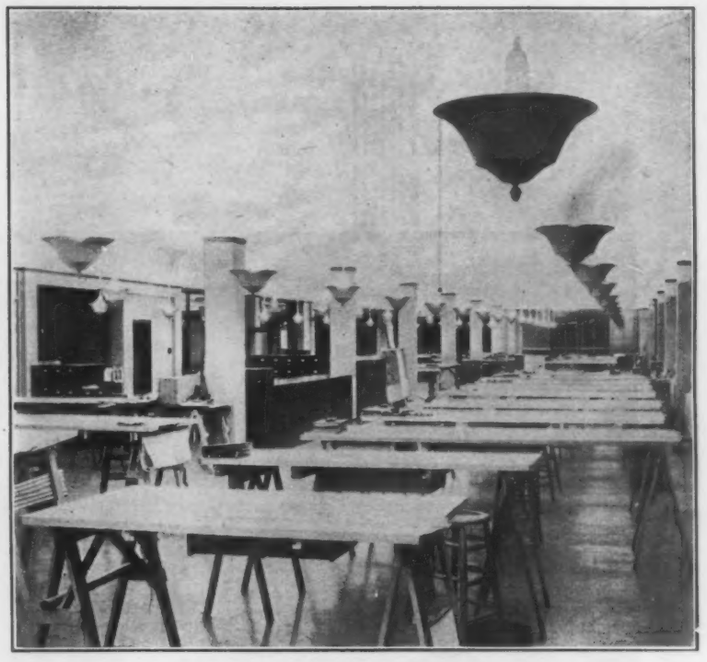
Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse

T 31573

Butte, 52 East Broadway
Denver, 910 Fifteenth St.
El Paso, Mills Bldg.
Emeryville, 1466 Powell St.
Los Angeles, 420 South San Pedro St.
Long Beach, 1601 W. Anaheim Blvd.
Portland, 901-2-3 Porter Bldg.
Phoenix, Ariz., 412 Luhrs Bldg.
Sacramento, 1109 Ninth St.
Salt Lake City, 10 West First South St.
San Diego, 803 Sixth St.
Seattle, Lloyd Bldg., 603 Stewart St.
San Francisco, 1 Montgomery St.
Spokane, 1322-23 Old National Bank Bldg.
Tacoma, 1021 Pacific Ave.

To Everyone concerned with Lighting Fixtures



Special "Permaflectors" manufactured by Dwyer & Rhodes, Seattle, and installed in drafting room of Boeing Airplane Co., Seattle.

HERE'S a story that should be read by every manufacturer of fixtures and every jobber and contractor who handles and installs fixtures.
It has to do with a matter that grows increasingly important as the facts surrounding it become more generally known.

Years ago, before the introduction of gas-filled lamps, the use of rubber covered wire in fixtures was almost universal. There was more or less trouble with fixture wire in fixtures equipped with mogul base lamps, particularly the chain hanger type where the motion of the pendant flexed the wire, crumbled off the baked out, brittle insulation and caused a short.

WHAT THE TEST SHOWED

Investigations were made. As a result the Code specified that in every fixture where the socket temperature reached 120° F. a heat-resisting wire should be used. It considered that this temperature was reached in all mogul base sockets.

Then along came gas filled lamps with their higher operating temperatures. Trouble began to develop where there had been no trouble before. Surprising as it may seem, it was found that almost any standard base lamp developed a socket temperature of 120° F. in a few minutes and far higher temperatures within an hour's time. *This meant that practically every fixture, unless wired with heat resisting wire, was hung in violation of the National Electrical Code.*

In some localities electrical inspectors began to enforce the letter of the Code. Far sighted manufacturers began to consider this matter. They realized that sooner or later something would be done about such a situation.

Since the problem was one of heat they decided to use wire insulated with the basic heat-resisting material—asbestos. Their natural selection of ROCKBESTOS Fixture Wire was only logical.

These manufacturers are makers of fine fixtures. By wiring them with a fine fixture wire they secure the favorable attitude of local inspectors. They fear no inspection after the fixtures are installed. And by the fact that they use ROCKBESTOS in their fixtures they trade on the confidence which is felt in the name ROCKBESTOS as representing thorough development and high quality in heatproof wires and cables.

ROCKBESTOS PRODUCTS CORPORATION

360 NINTH STREET	SAN FRANCISCO
914 1ST AVENUE SO	SEATTLE
430 COLYTON STREET	LOS ANGELES

ROCKBESTOS—*the wire with permanent insulation*

NEW»

*PYREX Insulators

» A 66 Kv. Transparent Insulator . . . .

You couldn't hide a defect in a . . . .

•PYREX POWER INSULATOR

It can be visually inspected clear through to the pin hole

Specifications for
No. 663 •PYREX Insulator

Dry Flashover	195 kv.
Wet Flashover	135 kv.
Leakage Distance	32½″
Arc Distance,—Wet	10″
Size of Pin Hole	1¾″
Minimum Length of Pin	13″
Net Weight, each	27½ lbs.
Weight each, packed	34 lbs.
Number in Package	one
Type of Package	box

Electrical characteristics were measured under A. I. E. E. standard conditions. Voltages were determined by sphere gap measurement.

•PYREX « Is a trademark and indicates manufacture by Corning Glass Works, Corning, N. Y.

A Super Insulator

for Super Service

J-D

Dead-End Insulators

The new J-D Dead-End insulator maintains its mechanical strength and most of its insulating value even when the skirts are shattered. It is really massive. This massive porcelain has a 6-inch leakage distance under any condition of damage. The tensile strength is 50% to 100% greater than units now used for distribution and low voltage work. Daily more public utilities are adopting it as standard.

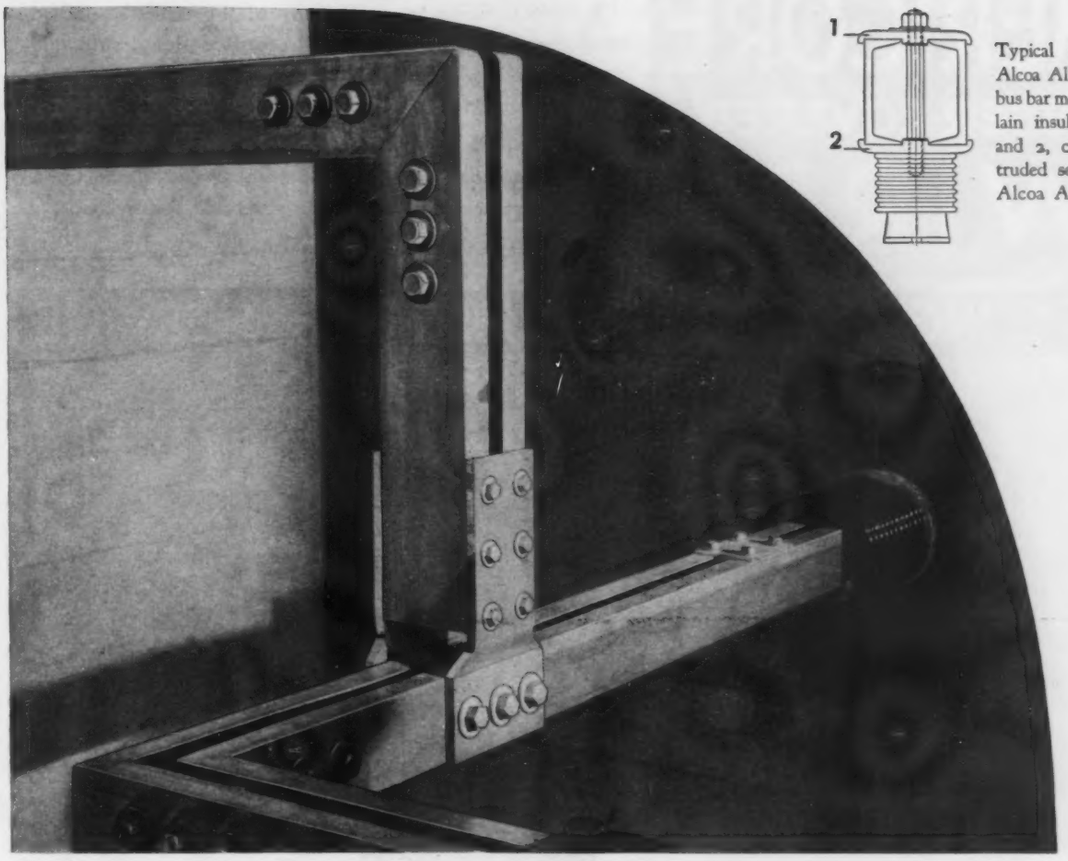
JEFFERY-DEWITT

INSULATOR COMPANY

KENOVA . . . WEST VIRGINIA

Pacific Coast Agencies

Garland-Affolter Engineering Corp., Rialto Bldg., San Francisco, Calif.
Garland-Affolter Engineering Corp., L. W. Hellman Bldg., Los Angeles, Calif.
Garland-Affolter Engineering Corp., Alaska Bldg., Seattle, Wash.
L. Brandenburger, 149 W. 2nd South, Salt Lake City, Utah
A. F. Krippner, 1429 18th St., Denver, Colorado



Typical arrangement of Alcoa Aluminum channel bus bar mounted on porcelain insulator. Figures 1 and 2, clamps from extruded section of strong Alcoa Aluminum alloy.

Aluminum Channel Bus Bar is more rigid and requires fewer supports

This 440 volt A.C. bus at the Chute à Caron Hydro-Electric Development shows the construction possibilities of Alcoa Aluminum channel bus bar. This new bus bar shape is available in long lengths, requires few supports and makes erection rapid and easy. In time and weight-saving alone Aluminum channel bus bar proves its value.

Alcoa Aluminum channel bus bar provides more efficient metal distribution for heavy A.C. currents than any other type of bar. Erected flange to flange to form a hollow square, it assures ample internal ventilation. For currents over 3,000 amperes channel bus bar construction occupies less space than assemblies generally used.

This bus bar is available in long lengths, 45 feet or more, and in standard sizes up to 8 inches. Compared with flat bar, Aluminum channel bus bar provides greater rigidity with equal ease of assembly. Compared with tubular bar, it has lower reactance and requires less complicated fittings.

Let us supply you with the electrical characteristics of Alcoa Aluminum channel bus bar; its weight and other technical data. ALUMINUM COMPANY *of* AMERICA; 2431 Oliver Building, PITTSBURGH, PENNA.

ALCOA ALUMINUM

REG. U. S. PAT. OFF.

BUS BARS MADE OF
ALCOA ALUMINUM

Far Western Offices: Western Pacific Bldg., 1031 South Broadway, Los Angeles, Cal.; 709 Rialto Bldg., San Francisco, Cal.

AMERICORE
RUBBER COVERED
WIRE

THE use of American Steel & Wire Company Americore Rubber Covered Wire, in many of the nation's leading structures, is due to its proved record for long, safe and trouble-free service. Once installed, it performs its task in a manner that brings lasting credit to those who specify it.

Made by a reputable manufacturer—one hundred years of wire making experience is back of it. Meets all National Code requirements and made in various sizes and constructions.

Any of our sales offices will cooperate with you.

FOR LONG-SAFE-and TROUBLE-FREE SERVICE

1831 COMMEMORATING 100 YEARS of PROGRESS IN WIRE MAKING 1931

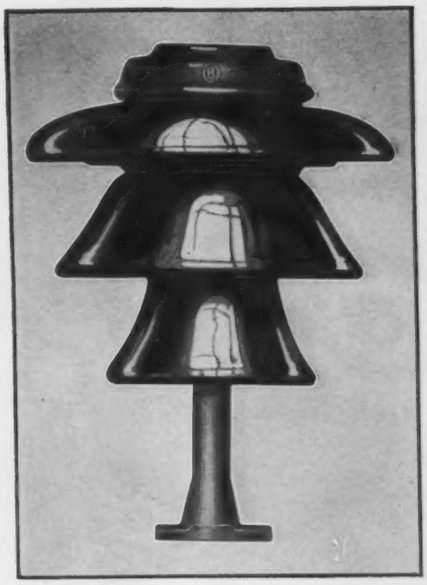
AMERICAN STEEL & WIRE COMPANY

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

Pacific Coast Distributors

COLUMBIA STEEL COMPANY

SAN FRANCISCO LOS ANGELES PORTLAND SEATTLE HONOLULU



No. 27320. *General rating 46,000 volts, overall height 18 inches. Diameter of porcelain 13½ inches. Will meet N.E.M.A. standard flashover requirements of 125 kv. wet and 155 kv. dry. 3 inch bolt circle, 4 bolt holes tapped ½-in. 13 U.S.S.*

New

O-B Switch and Bus Insulators

No. 31302. *General rating 23,000 volts, overall height 12 inches. Diameter of porcelain 9 inches. Will meet N.E.M.A. standard flashover requirements of 70 kv. wet and 95 kv. dry. 3-in. bolt circle, 4 bolt holes tapped ½-in. 13 U.S.S.*

Which Conform to the new N.E.M.A. Standards.

RECOGNIZING the need for standardization in switch and bus insulators, the National Electrical Manufacturers Association, a year ago, appointed a special committee to investigate this problem. At the Hot Springs meeting, May 18th to 21st the findings and recommendations of this committee were submitted, and adopted as standard by the association.

The many advantages to be gained by these new N.E.M.A. standards are recognized. Substation design, maintenance and repairs are simplified. In coordinating line and station insulation, the established values of switch and bus insulators make possible a proper balance with line insulation.

So, to make these N.E.M.A. standards immediately effective, there is announced a new line of O-B switch and bus insulators for voltages from 7,500 to 69,000. This new line embodies all of the advantages inherent in earlier designs; such as the treated sanded surface; the proper ratio of metal to porcelain; design and contour of the parts; jig assembly which insures accuracy in overall height, vertical alignment of the bolt holes and paralleling of the upper and lower faces.

Four of the new group of O-B switch and bus insulators, which conform to the new N.E.M.A. standards are illustrated. Your O-B representative has complete information on these as well as insulators for higher voltages on which standardization is not completed.

No. 31301 (*Left*) *15,000 volts. Ht. 10-in. Porcelain Dia. 7½-in. Meets N.E.M.A. standard flashover requirements of 50 kv. wet and 75 kv. dry.*

No. 31300 (*Right*) *General rating 7,500 volts, overall height 7⅛ inches. Diameter of porcelain 6¾ inches. Will meet N.E.M.A. standard flashover requirements of 35 kv. wet and 55 kv. dry. 3-in. bolt circle, 4 bolt holes tapped ½-in. 13 U.S.S.*

1435H

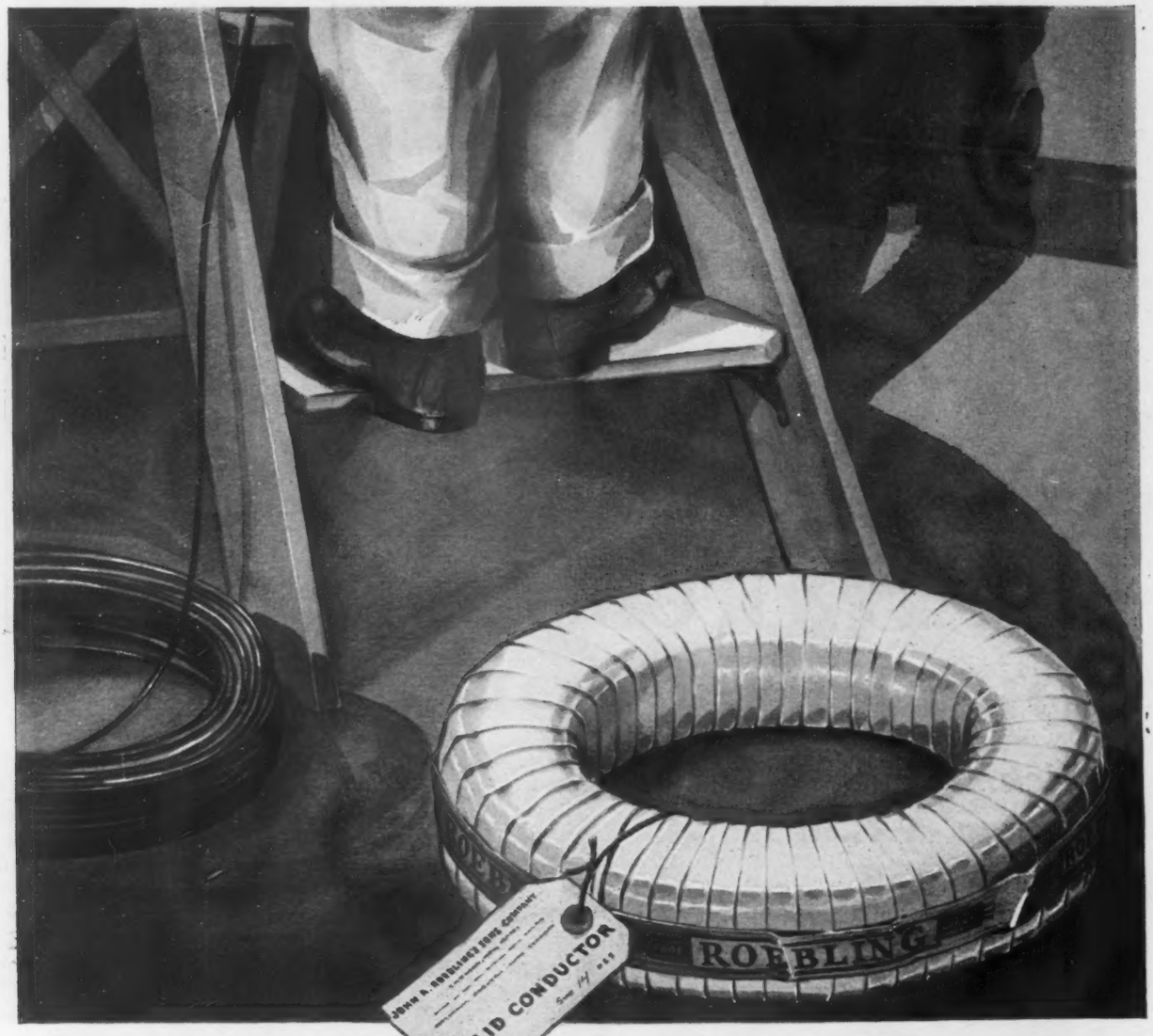
OHIO BRASS COMPANY, MANSFIELD, OHIO
Canadian Ohio Brass Company Limited, Niagara Falls, Canada

LOS ANGELES 417 So. Hill St. **SAN FRANCISCO** 215 Market St. **SEATTLE** 1018 Northern Life Tower

Ohio Brass Co.

NEW YORK PITTSBURGH CHICAGO CLEVELAND ST. LOUIS ATLANTA DALLAS
PHILADELPHIA BOSTON LOS ANGELES SAN FRANCISCO SEATTLE

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES



ROEBLING

NO MATTER what your electrical wire or cable requirements may be—whether for Lead Sheathed Power Cable, Rubber Covered Code, Parkway Cable, or even hair-fine magnet wire for winding coils—they can be satisfied by the Roebling Line.

Electric light and power companies, electrical contractors, and others will find every type of electrical wire and cable in the comprehensive Roebling Line to be of the very highest quality. Roebling has been making these products for over 45 years and has always adhered to most exacting standards.

Roebling is geared up to provide prompt service. Sales representatives and stocks of many types of wires and cables are located in the cities listed below.

Rubber Covered Wires and Cables : Braided and Leaded : Code; Intermediate; 30% » Power Cables : Paper; Cambric; Rubber » Submarine Cables » Tree Wire » Parkway Cable » Service Cables » Station Cables » Rubber Covered Control Cables » Slow-burning Wires and Cables » Weatherproof Wires and Cables » Police-Fire Alarm Cable » Portable Cords » Annunciator Wire » And a wide variety of other wires and cables.

JOHN A. ROEBLING'S SONS COMPANY OF CALIFORNIA
San Francisco Los Angeles Seattle Portland

ELECTRICAL WIRES AND CABLES

Cleveland's New Stadium

ANOTHER STEELTUBES JOB

WITH permanent seats for 78,000; seating 100,000 at football games, and 125,000 at fights, Cleveland's municipal stadium ranks with the world's greatest sport structures. And none is more modern than this two and one-half million dollar project.

Into this great stadium went two carloads of Steeltubes Rigid Thin-wall Conduit, carrying the conductors for the general lighting system.

Steeltubes deserves careful consideration, not only for the large wiring jobs, but for homes, factories, commercial buildings . . . . wherever the utmost value from every electrical dollar is desired. Steeltubes is rigid . . . strong . . . uniform. It is easy to handle . . . no threading. More speed . . . economy and quality in conduit work. It will pay you to find out all about it . . . and to TRY IT.

Electrical Division

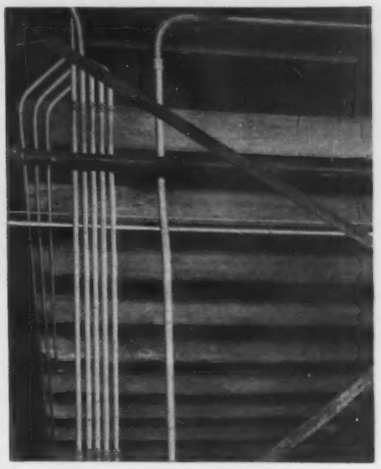
STEEL AND TUBES, INC.

Cleveland, Ohio

(A Unit of Republic Steel Corp.)

(World Wide Photo)

Cleveland's Municipal Stadium. Architects: Walker & Weeks; Engineers: Osborn Engineering Company; Electrical Contractor: Parker Electric Company.

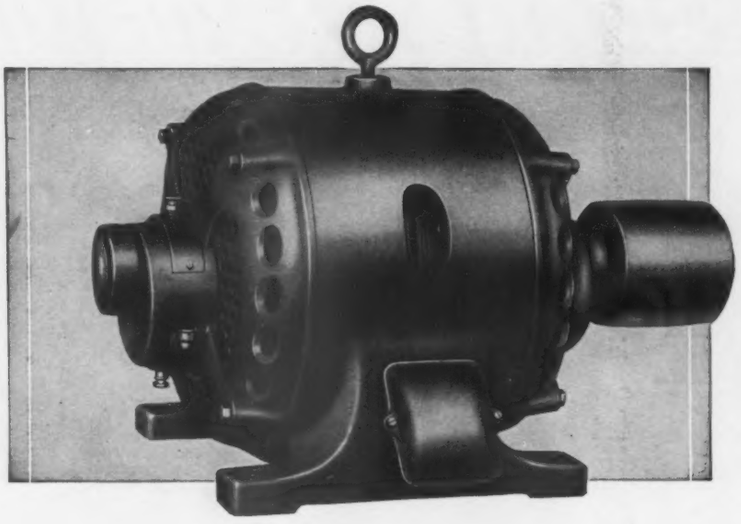


These two views show installations of STEELTUBES *in the new Stadium. Note the straight runs and uniform bends that contribute to the appearance of the* STEELTUBES *job and help to make easier the work of pulling through conductors.*

Steeltubes

THE MODERN THREADLESS CONDUIT

THEY KEEP A-RUNNING

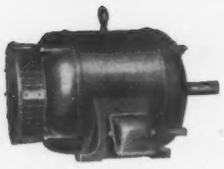


10 Horse Power Century Type SCH Low Starting Current... High Torque Double Squirrel Cage Induction 3 Phase Motor.

HIGH TORQUE— MORE ECONOMICAL

On general purpose jobs, it is often possible to use a lower-rated Century Type SCH Double Squirrel Cage Motor in place of a higher-rated standard Single Squirrel Cage Motor—because the static torque of the Double Squirrel Cage type is substantially higher than that of a standard normal torque squirrel cage motor of the same rating.

Another economy provided for by the Type SCH motor results from its drawing less starting current than the corresponding size normal torque single squirrel cage motor . . . No special current-limiting starting equipment is necessary for 30 horse power and smaller sizes, because their starting currents are within NELA requirements. Any approved across-the-line switch or starter may be used for starting.



Totally-Enclosed Fan-Cooled Motor. Built in standard sizes from 1½ to 150 horse power.

Built in standard sizes from 2 to 100 horse power.

CENTURY ELECTRIC COMPANY

1806 PINE STREET ' ' ' ST. LOUIS, MO.

40 U. S. and Canadian Stock Points and More Than 75 Outside Thereof

SINGLE PHASE, THREE PHASE, AND DIRECT CURRENT MOTORS

Century MOTORS

MOTOR GENERATOR SETS, ROTARY CONVERTORS, FANS AND VENTILATORS

SCH-2-10

FOR MORE THAN 27 YEARS AT ST. LOUIS

Stop! Before You Buy Switchgear on a Price Basis Only—

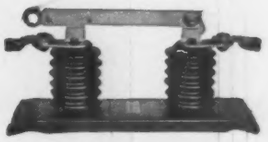
Look! For Careful Design, Selected Materials and Fine Workmanship—

Listen! to the Satisfactory Experiences of Thousands of Elpeco Users—

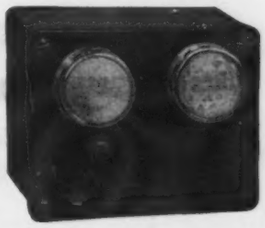
ARE YOU INTERESTED IN THESE NEW 1931 LEADERS?

Elpeco Type TS Group Operated Disconnect, rotates to 90° opening, short blades permit smaller phase spacing. *Bulletin 207.*

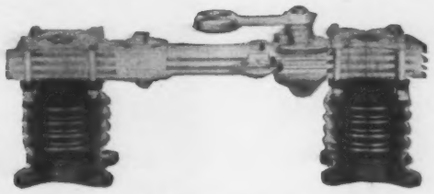
Elpeco Type 186 Disconnecting Switch, 44-Kv., 3-pole, group operated, in open position.



Disconnecting switches embodying unusual developments.
Bulletin 101-B



Signal Boxes with faceted lenses, Indicating Lamps, Lenses.
Bulletin 607.



This is a non-heating switch due to fact that 25 lb. pressure on the "screw jack" lock exerts a pressure on contacts of 300 to 7000 lbs.
Bulletin 101-B

Heavy Duty Outdoor Bus Supports, Post Type for upright or underhung mounting.
Bulletin 202-C.

ELPEC

ELECTRIC POWER EQUIPMENT CORPORATION

412-420 NORTH EIGHTEENTH ST. PHILADELPHIA, PA.

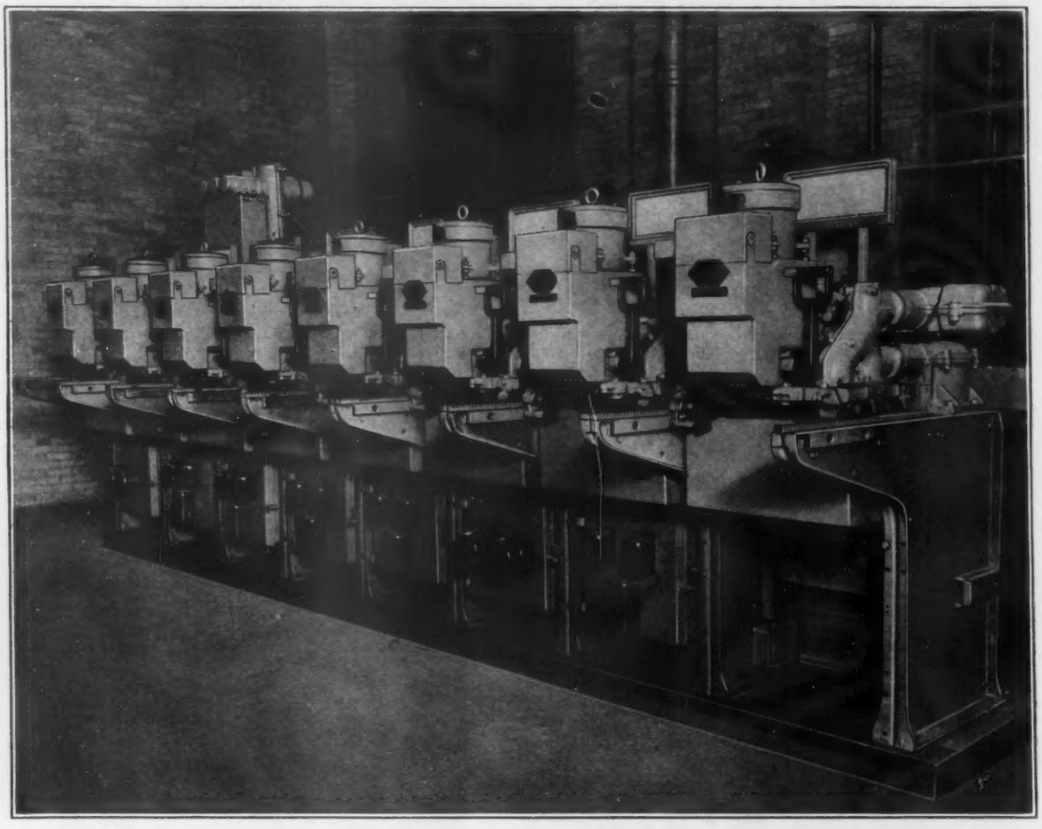
Reliable Switching Equipment *for* Electric Power Control

Armorclad Switchgear is used in many large power plants for controlling the circuits necessary in maintaining reliable electric service. It is also used in large office buildings, industrial plants, and steel mills, wherever the power requirements are relatively large.

Armorclad Switchgear is noted for its safety, compactness, and sturdiness of design, which insures efficient and reliable operation. It is equipped with a complete system of interlocks and is arranged for easy observation of switch position which practically eliminates mistakes in operation.

Armorclad Switchgear is available in sizes to cover a complete line of oil circuit breaker equipment, suitable for serving the main and auxiliary circuits in the power house or sub-station, central station, and industrial plant.

It will pay you to investigate Allis-Chalmers Armorclad Switchgear, when considering new switching equipment. Our engineers will be glad to assist you with your switching problems.



A group of eight Type C Armorclad Switchgear Units.

ALLIS-CHALMERS

Allis-Chalmers Manufacturing Company, Milwaukee

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Rialto Building, San Francisco, Calif. 1117 Rowan Building, Los Angeles, Calif. 1623 Smith Tower, Seattle, Wash. 505 Lumbermen's Building, Portland, Ore. 222 Continental Oil Building, Denver, Colo. 915 Kearns Building, Salt Lake City, Utah.

To help you put your finger on the one right motor!

Perhaps you've faced that problem of putting your finger on the one right motor for a given job at a given time. Perhaps you've found it quite a task. But it need not be! Now, thanks to Graybar's nationwide distribution on standard motors no one need seek further than the nearest Graybar distributing house . . . You'll find one right in your own vicinity. You'll find your motor needs anticipated by the maintenance of an ample stock. And you'll find, too, a convenient source — not only of motors — but of 60,000 other electrical items for each and every electrical need.

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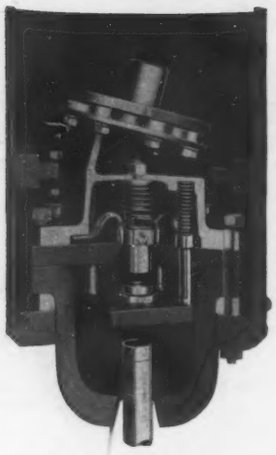
OFFICES IN 76 PRINCIPAL CITIES. EXECUTIVE OFFICES: GRAYBAR BUILDING, NEW YORK, N. Y.

SAN FRANCISCO SEATTLE LOS ANGELES OAKLAND SPOKANE PORTLAND TACOMA

Oil-Blast Explosion Chamber PROVED by these tests



The Philo Station on the 132-kv. system of the Ohio Power Company was used as the proving ground for the new oil-blast explosion chamber. The tests were conducted by courtesy of the American Gas and Electric Company.
Immediately after the 40 tests and before any inspection had been made, the circuit breaker interrupted the charging current of two different lines from the Philo Station four times. The average arcing time was 2.7 cycles with a maximum of four cycles and an average arc length of 3.2 inches.

Rate of recovery voltage rise	Duty	Line volts kv.	Rms. amperes initial in arc	Kv-a. interrupted	Short-circuit duration cycles	Breaker operating time cycles	Arc duration cycles	Arc length in.
270 Volts per microsecond	CO	140	2,550	617,000	5.5	5.2	3.0	4.0
	CO	140	3,450	835,000	5.5	5.2	3.0	4.2
	OCO	140		No current records				
	OCO	140	3,000	725,000	6.0	5.7	3.0	4.5
	CO	140	3,550	860,000	6.0	5.7	2.8	6.0
	CO	140	4,900	1,188,000	6.0	5.2	3.2	5.0
	CO	140	4,450	1,080,000	6.0	5.5	2.5	5.1
	CO	140	4,300	1,042,000	5.0	4.5	1.6	2.7
	OCO	140	4,250	1,030,000	5.0	4.5	2.0	3.0
	CO	140	6,950	1,690,000	6.0	5.2	2.4	5.3
	CO	140	6,350	1,540,000	5.0	4.2	2.0	2.5
	OCO	140	6,800	1,650,000	6.0	5.5	3.0	5.0
	OCO	140	6,550	1,590,000	5.5	4.5	2.4	3.5
	OCO	140	6,550	1,590,000	6.0	5.7	2.9	5.2
	OCO	140	7,150	1,735,000	6.0	5.5	3.0	6.4
600 Volts per microsecond	CO	140	3,250	787,000	7.0	5.7	4.5	8.0
	CO	140	2,700	650,000	7.5	7.0	4.7	9.1
	OCO	140	3,250	788,000	7.0	6.7	3.9	8.0
	OCO	140	3,000	726,000	7.0	6.5	4.0	8.0
	CO	140	3,650	885,000	7.0	6.2	3.7	6.5
	CO	140	3,450	835,000	7.0	6.2	3.5	8.5
	CO	140	4,700	1,140,000	6.0	5.5	2.7	5.3
	CO	140	4,050	983,000	6.0	5.7	2.7	5.5
	OCO	140	3,900	946,000	6.5	5.5	3.6	7.1
2400 Volts per microsecond	CO	140	2,800	680,000	7.0	6.2	4.2	8.5
	CO	140	3,300	800,000	6.5	6.2	4.1	8.2
	OCO	140	3,550	860,000	6.5	6.2	3.5	6.0
	OCO	140	3,100	750,000	7.0	6.5	4.0	8.1
	CO	140	2,100	510,000	8.0	7.2	4.7	10.5
	CO	140	2,700	655,000	8.5	7.7	5.5	11.5
	CO	140	3,100	752,000	7.0	6.2	4.2	8.5
	CO	140	730	177,000	9.0	8.0	5.7	9.3
	OCO	140	800	194,000	8.5	7.2	5.0	8.0
	CO	140	5,300	1,285,000	6.5	6.2	4.0	8.1
	CO	140	4,100	995,000	6.5	5.7	2.7	6.0
	CO	140	4,100	995,000	8.0	7.0	4.6	14.5
	CO	140	3,800	922,000	6.0	5.5	3.2	8.0
	OCO	140	3,650	885,000	6.5	6.0	3.5	6.7
	CO	140	4,500	1,090,000	8.0	7.7	4.4	13.3
	CO	140	4,400	1,068,000	6.5	6.2	3.2	7.0

HERE are tabulated the results of the 40 tests made on a General Electric Type FHKO-139 oil circuit breaker equipped with oil-blast explosion chambers.

A summary shows that, for voltage-recovery rates of 270 and 600 volts per microsecond, the normal condition in actual service, the average arc duration was 3 cycles; the average arc length was 5.6 inches; the time of breaker operation averaged 5.5 cycles; and the line voltage was 140 kv.

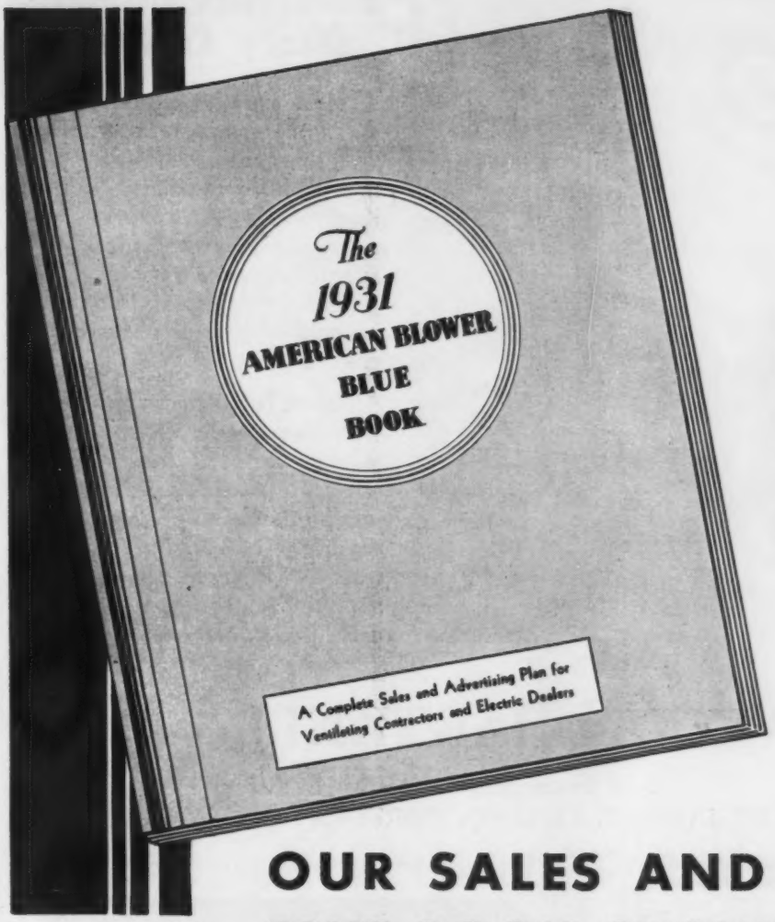
Further analysis of the tests shows that, even for a voltage recovery rate of 2400 volts per microsecond, the maximum obtainable and a condition seldom realized in actual service, the arc duration, arc length, and time of breaker operation were consistently small.

The concentration of power for these tests reached a value of nearly 1,750,000 kv-a., the greatest ever made possible for short-circuit tests at any voltage.

[JOIN US IN THE GENERAL ELECTRIC PROGRAM, BROADCAST EVERY SATURDAY EVENING ON A NATION-WIDE N.B.C. NETWORK]

470-23H

GENERAL ELECTRIC
SWITCHGEAR



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OUR SALES AND ADVERTISING BLUE BOOK SHOWS YOU HOW . .

IT'S easy to sell electric ventilating equipment now . . . in any type of business . . . when you have a *plan.* That is why we invite you to write at once for the American Blower Sales and Advertising Blue Book. It contains everything you need to set yourself up as electric ventilation headquarters in your territory. It shows you *where* and *how* to make sales. It pictures markets, sales helps, technical bulletins, newspaper advertisements, etc. It contains

WRITE FOR A COPY TODAY

samples of folders, cards, surveys, envelope stuffers —as complete and effective an assortment of direct mail literature as has ever been offered in the electric ventilation business. And what is more, all this literature is specially *printed* — with the electrical contractor's or dealer's own address and message. There isn't a minute to lose. The hotter the weather, the hotter your prospects! Send the coupon at once.

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"Sirocco"

VENTILATING, HEATING, AIR CONDITIONING, DRYING, MECHANICAL DRAFT

MANUFACTURERS OF ALL TYPES OF AIR HANDLING EQUIPMENT SINCE 1881

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Kearney Double Duty Cutouts

SAFE working conditions dictate the use of only plastic wet process porcelain in the manufacture of primary cutouts. Kearney Double Duty Cutout porcelain equalizes in all respects the porcelain used in high potential insulators which cannot be said of cast or pressed porcelain.

*A lateral adjustment is provided with the swivel hanger which permits the cutout to be turned toward the pole for greater ease in operating. This also insures the discharge of hot gases and molten metal away from the lineman should the cutout be closed on a short circuit.

MAYDWELL & HARTZELL

INCORPORATED

Los Angeles **San Francisco** **Seattle**

FACTORY DISTRIBUTORS OF JAMES R. KEARNEY CORPORATION PRODUCTS

38 *years' service*

has proved the superiority of

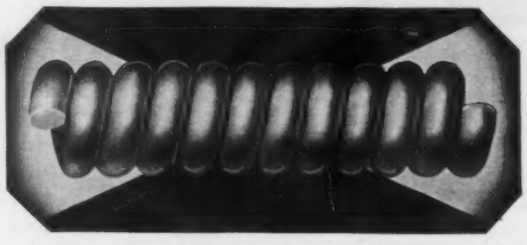
ORANGEBURG FIBRE CONDUIT

THE thousands of miles of Orangeburg Fibre Conduit in use today vouch for its dependability in protecting underground circuits. Supplied in uniform lengths, it is easy to install, costs little to handle. Stocks carried at the manufacturing plants in Orangeburg, N. Y.; Richmond, Ind., and in all larger cities insure prompt shipments.

The Fibre Conduit Co.

ORANGEBURG, N. Y.

SOLE SELLING AGENT **Johns-Manville** 292 Madison Ave., N. Y.C.



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Crapo Galvanized Wire can be wrapped around its own diameter without injury to its pure zinc coating....That is one of a number of reasons why **Crapo** Galvanized Telephone Wire and Strand can be depended upon to reduce maintenance cost.

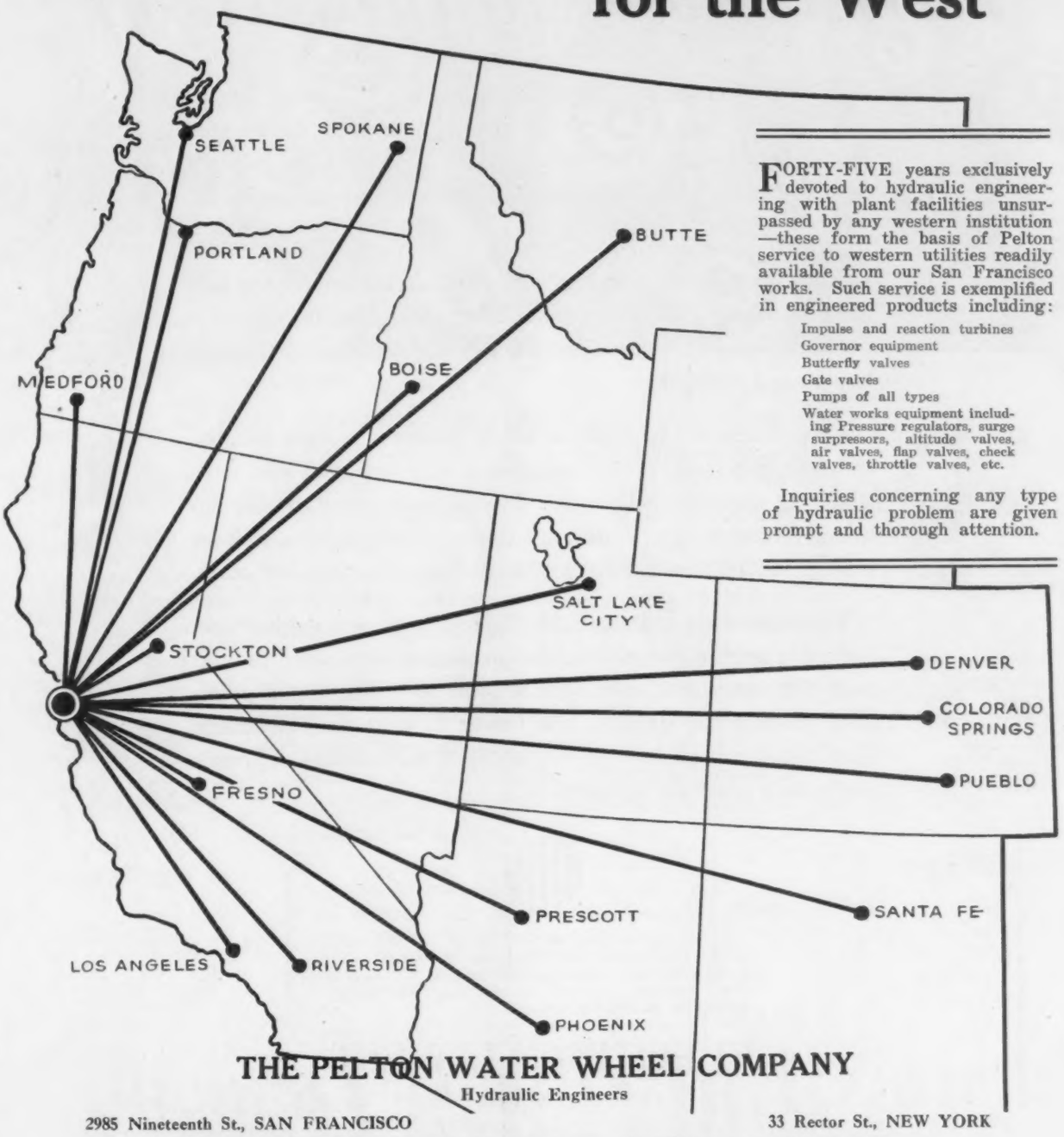
Look for the **Crapo** Seal!

Indiana Steel & Wire Co.
Muncie, Indiana

Crapo GALVANIZED PRODUCTS

PELTON

Hydraulic Engineering Service for the West



FORTY-FIVE years exclusively devoted to hydraulic engineering with plant facilities unsurpassed by any western institution—these form the basis of Pelton service to western utilities readily available from our San Francisco works. Such service is exemplified in engineered products including:

- Impulse and reaction turbines
- Governor equipment
- Butterfly valves
- Gate valves
- Pumps of all types
- Water works equipment including Pressure regulators, surge surpressors, altitude valves, air valves, flap valves, check valves, throttle valves, etc.

Inquiries concerning any type of hydraulic problem are given prompt and thorough attention.

THE PELTON WATER WHEEL COMPANY
Hydraulic Engineers

2985 Nineteenth St., SAN FRANCISCO — 33 Rector St., NEW YORK

Associated Companies: I. P. Morris & De LaVergne, Inc., Philadelphia Pa.; Dominion Engineering Works, Ltd., Montreal. Pacific Coast Representative for Larner Engineering Co., Philadelphia, Pa.

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Business Paper Advertising ...*Sign of an Efficient Manufacturer*

WHEN you see a manufacturer's advertising in the pages of your business paper, you may know that *that* manufacturer is not only efficient in production, but that he also knows how to *distribute* effectively and economically.

And that is important to you as a purchaser of manufactured articles. For the cost of distribution enters into the cost of everything you buy. Efficiently distributed goods cost less, quality for quality, than goods distributed through haphazard methods.

Manufacturers who advertise in business papers use the shortest, directest, most economical way to reach you with a selling message. They are buying concentrated circulation *without waste*. They are applying advertising dollars wisely where those dollars will reduce other selling costs.

Through their selection of efficient means to advertise, they are giving proof that the products they offer to you bear the minimum cost of distribution — that those products, quality for quality, are lower in cost than products distributed either laboriously *without* advertising or carelessly with *wasteful* advertising.

ABP

THIS SYMBOL *identifies an ABP paper . . . It stands for honest, known, paid circulation; straightforward business methods, and editorial standards that insure reader interest . . . These are the factors that make a valuable advertising medium.*

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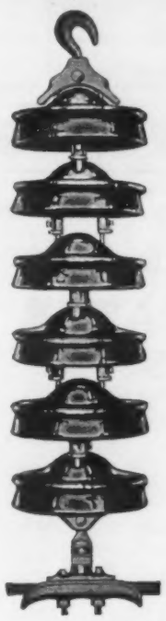
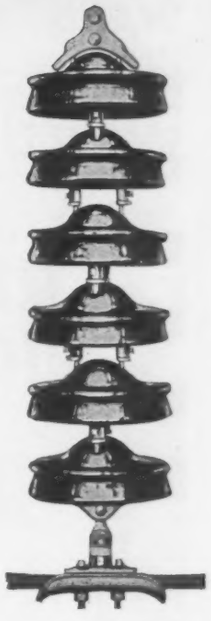


A typical assembly of THOMAS-HEWLETT units with blind adapters top and bottom into which suitable terminal fittings can be inserted.

UNQUESTIONABLY the most desirable characteristic in a high tension insulator, aside from *Reliability* is *LONG LIFE*. . . . In this respect, the THOMAS-HEWLETT is unparalleled. Many of the oldest suspension-strain transmission systems in the country are HEWLETT equipped. . . and boast flawless records of *Dependability*. Although the HEWLETT is the earliest of all suspension insulators, it has required no radical alterations in design through the years. It stands alone as the one unit which stresses the porcelain structure most advantageously . . . *in compression*. It requires no cement, alloy or composition in assembly. It insures an even distribution of the mechanical load.

THOMAS-HEWLETT Insulators are flexible, resilient and all porcelain. They can be assembled in strings to meet your exact requirements with perfect ease. A wide range of terminal fittings are provided. See complete listing in the new *THOMAS INSULATOR CATALOG No. 30.*



This style of THOMAS-HEWLETT assembly provides a clevis terminal at top and blind adapter for choice of terminal fittings at bottom.

Thomas LINK TYPE Hewlett

The R. THOMAS & SONS CO. . . . . EAST LIVERPOOL, OHIO
New York . . . . . Boston . . . . . Chicago . . . . . London
Graybar Electric Co., Inc., Sole Agents on Pacific Coast

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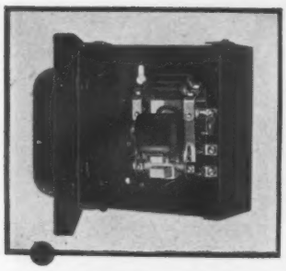
AND THEN ADD - ECONOMY



Ward Leonard Relay Mounted in Pressed Steel Box Provided with Mounting Holes and for Conduit Connections.

IN selecting equipment to meet the requirements of automatic or remote control problems, the critical buyer demands relays which will "more than do the job." Often satisfactory performance over a period of years depends just as much upon details of construction as upon correct basic design. And to Ward Leonard, the manufacture of relays is much more than a matter of efficient basic design.

Perfection of detail is the added factor in Ward Leonard relays. Listed among the 14 standard features in Bulletin 81,000 are the fine points of design and construction which satisfy every requirement of the critical buyer.

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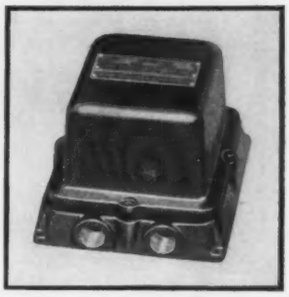

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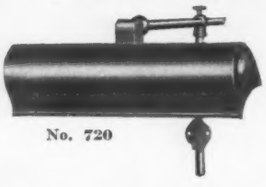

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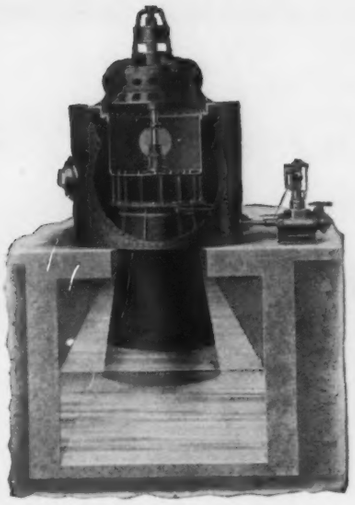

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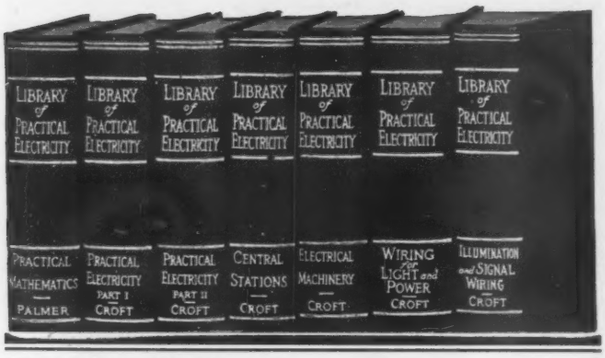
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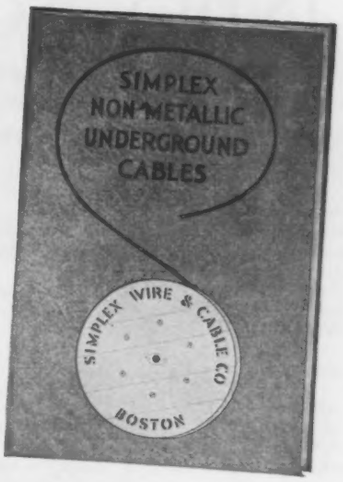

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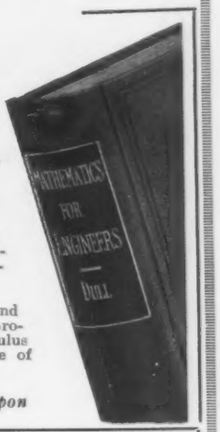

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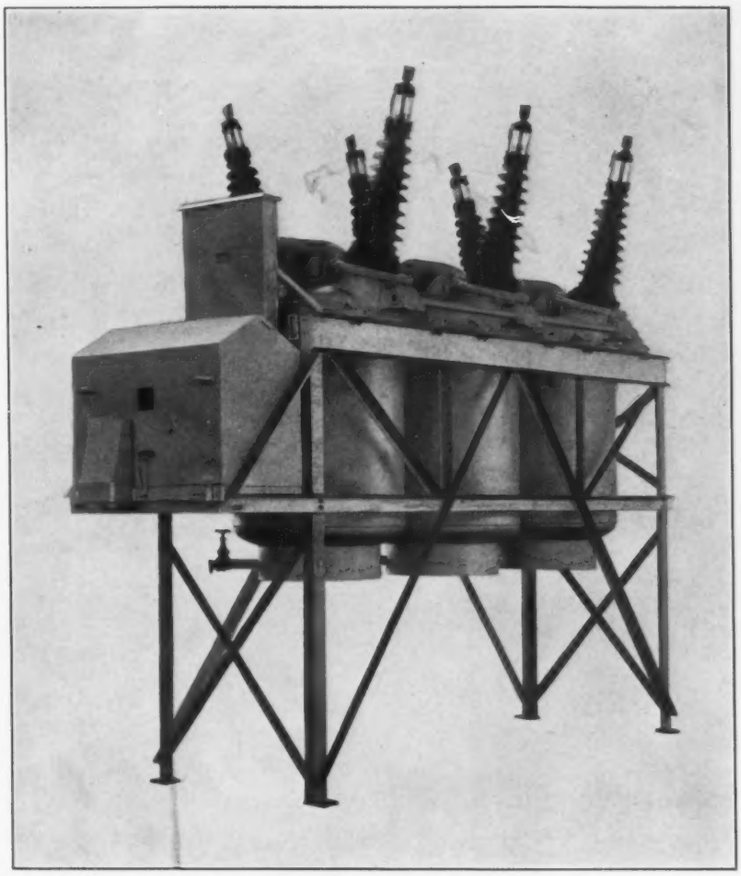

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